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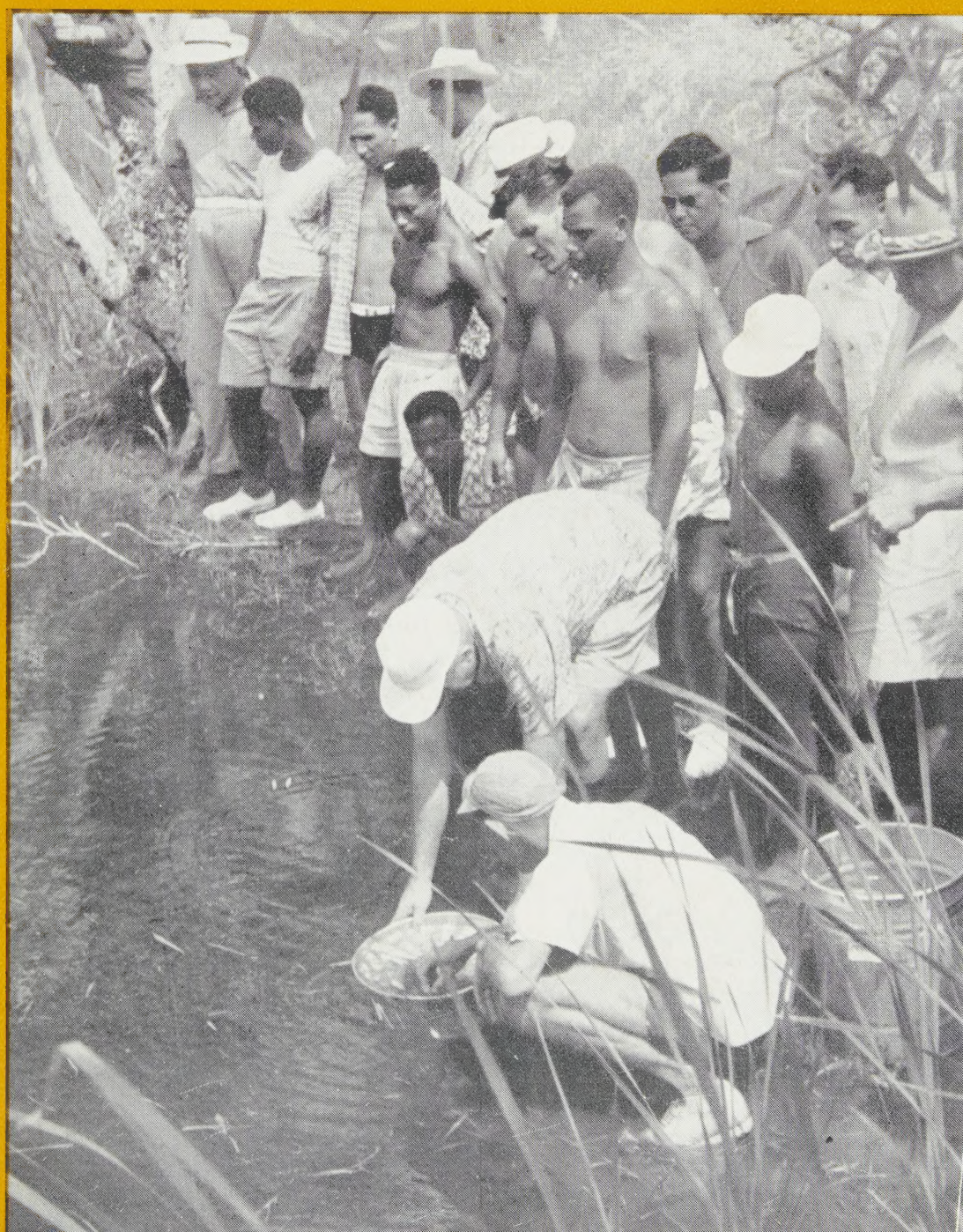
SPC
SOUTH PACIFIC COMMISSION

quarterly Bulletin



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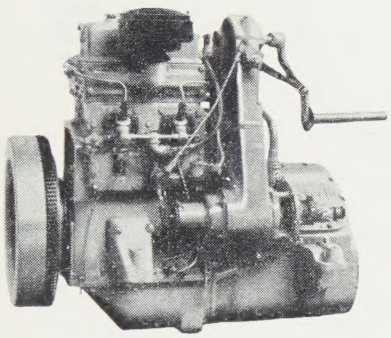

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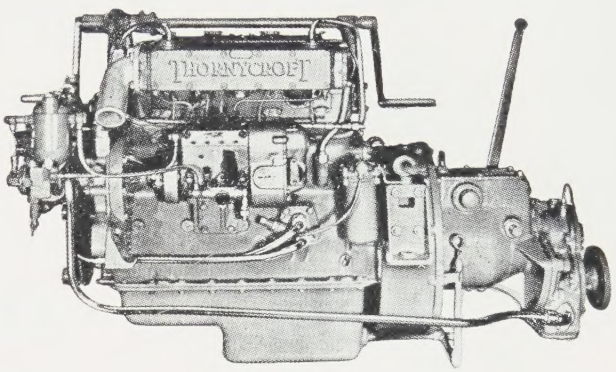

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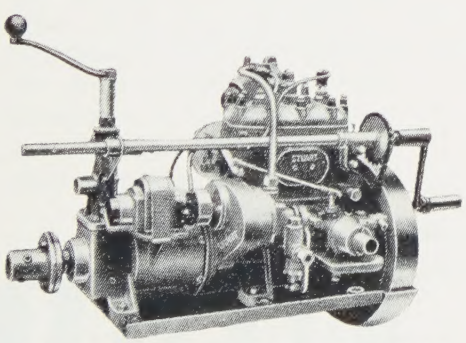

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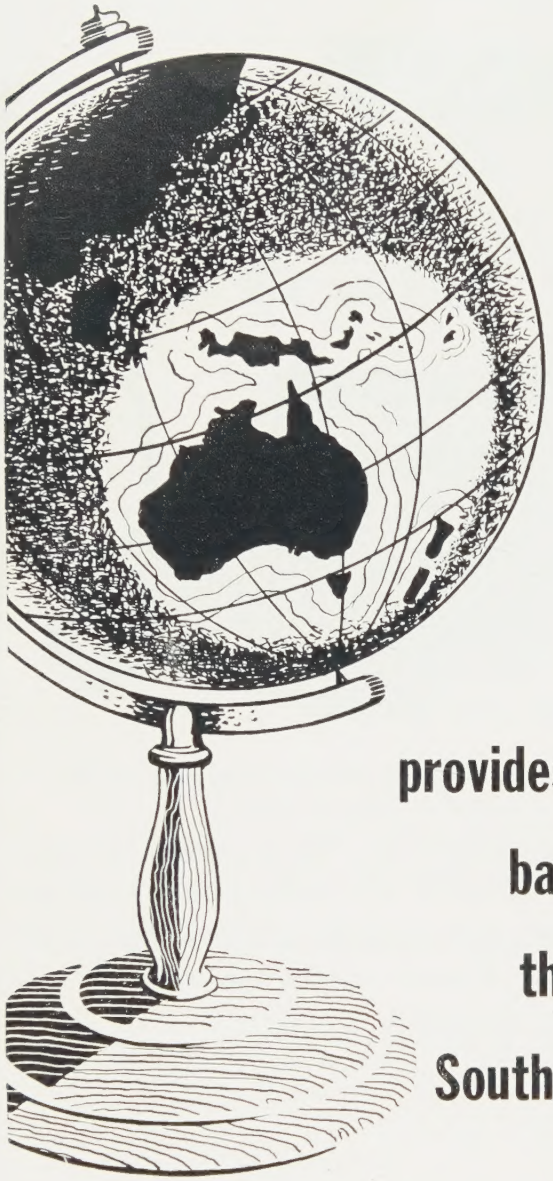

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The South Pacific Commission

The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of Island Territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific Island territories. It is concerned with social, economic and health matters. Its headquarters are at Nouméa, New Caledonia.

The Commission consists of not more than twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

The Research Council meets once a year. Members are appointed by the Commission, and are selected for their special knowledge of the programme of the Commission, and of the problems of the territories in relation to the work of the Commission. The function of the Research Council is to advise the Commission on research matters. The carrying out of approved research is the responsibility of the Secretary-General and other principal officers.

The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Suva in April, 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April, 1953. The third Conference was held in Nasinu, Fiji, in April-May, 1956.

The Commission's staff includes six principal officers, as follows: Secretary-General, Dr. Ralph Clairon Bedell; Deputy Secretary-General, Mr. John Ryan; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Dr. Richard Seddon. The powers and functions of the Deputy Chairman, Research Council, are at present being exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

NOTE: A map showing the area of concern to the Commission appears on the inside back cover.

Front Cover Photo

A practical demonstration for fisheries trainees. The Commission's fisheries officer, Mr. H. van Pel, releasing tilapia fingerlings in a natural pond on a cattle station in New Caledonia (story on page 13).

SPC QUARTERLY BULLETIN

VOL. 7. NO. 1 JANUARY, 1957

CONTENTS

	Page
Commission Holds Sixteenth Session. *By Ralph Clairon Bedell*	8
Fisheries Training Course Opens In Noumea	10
Fisheries Course Mid-Term Report. *By H. van Pel*	13
Pearl Shell Transfer In The Cook Islands. *By Ronald Powell*	15
Mechanized Rice Growing In Netherlands New Guinea. *By J. A. Lasschuit*	18
A Blood Transfusion Service For The Tropics. *By J. Kariks*	21
Raft Expedition On Round Voyage From Tahiti. *By Carlos Garcia-Palacios*	23
A Project In Community Education. *By Samson Albert*	24
Filariasis In The Cook Islands. *By M. O. T. Iyengar and M. A. U. Menon*	25
Problems Of Coffee Production In New Caledonia (2). *By E. J. E. Lefort*	28
Co-operative Trends In Western Samoa. *By R. H. Boyan*	31
Solar Stills. *By H. Masson*	33
Simple Method For Felling Coconut Palms. *By Ronald Powell*	38
FAO's Work In World Fisheries	39
Food Plants Of The South Sea Islands. *A review by H. S. McKee*	43
Quarterly Reading List No. 20	45
Unusual Fishing Method. *By Ronald Powell*	46
New Hot-Air Copra Drier For Smallholders	47
Trochus Fishing. *By René Gail*	48
"Pacific Reading"—Notes And News	50
Book List No. 16	51
Visual Aids	54

THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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Commissioners and advisers in attendance at the sixteenth session. Left to right, front row: Lt. Col. Hon. Ratu E. T. Cakobau, U.K., H. H. Vaskess, U.K.; K. A. Ryerson, U.S.A.; R. C. Bedell (Secretary-General); N. A. J. de Voogd, Netherlands (Chairman); J. R. Halligan, Australia; R. Lassalle-Sere, France; C. G. R. McKay, New Zealand; Dr. C. J. Grader, Netherlands. Back row: H. R. Bijl, Netherlands; P. K. Edmonds, New Zealand; Dr. A. S. Osborne, Miss E. Barr, U.S.A.; J. A. van Beuge, Netherlands; A. H. Loomes, C. Cox, Australia; R. Pons, France; R. G. Crocombe, New Zealand.

Commission Holds Sixteenth Session

The programme of the South Pacific Commission was approved for 1957 and the accomplishments made during 1956 were reviewed by the sixteenth session.

By RALPH CLAIRON BEDELL*

THE sixteenth session of the South Pacific Commission was held at its headquarters in Nouméa from October 18 to November 8. Commissioners and advisers attended from the six member nations.** Chairman for the session was His Excellency N. A. J. de Voogd, Senior Commissioner for the Netherlands.

For the first time in the history of the South Pacific Commission a member of a Pacific islands race represented a participating government at a session. Alternate Commissioner on the United Kingdom delegation for the last week of the sixteenth session was Lieut.-Col. the Hon. Ratu Edward Cakobau, O.B.E., M.C. He is a great-grandson of Ratu Cakobau, the paramount Chief who, with his nobles, ceded Fiji to Queen Victoria in 1884. A member of the Fiji Legislative Council and Executive Council, Ratu Edward, who is 47, holds the post of Economic Development Officer (Eastern) in the Fijian Affairs Administration.

At the sixteenth session final arrangements were reviewed for the inauguration of a new method of working for the Commission—the holding of courses to train Pacific islanders in ways of assisting their own peoples.

The first of these, the South Pacific Fisheries Training Course, opened at Commission headquarters on November 19 (see articles on pages 10 and 13), is being conducted in co-operation with the Food and Agriculture Organization.

Health Education

The Commission also approved the holding in 1957 of a training course in health education to be conducted in co-operation with the World Health Organization. Forty trainees from the Pacific Islands are expected to attend. It is believed that every Pacific island territory of concern to the Commission will have one or more trainees in this Course. As a result, a firm basis will be made for further practical work throughout the Pacific in Health Education.

Pasture And Livestock Institute

Further investigations will be made into a proposal to set up a pasture and livestock institute in New Guinea, to improve beef cattle production in the South Pacific.

A Commission-sponsored inter-governmental meeting of experts held in Melbourne last October considered the scheme was technically sound, and put forward detailed proposals for consideration at the sixteenth session of the Commission.

The capital costs of establishing the Institute are estimated at around £stg.160,000. Costs over a period of ten years would approximate £stg.800,000. It is believed that the necessary funds could be drawn from a variety of sources, including foundations and international bodies.

After examining the scheme the Commission directed that the possibilities of obtaining support to implement it be explored.

Rhinoceros Beetle Campaign

The Commission authorized continuation of its campaign against the rhinoceros beetle, the pest that is a serious threat to the coconut, main source of income in the Pacific.

Two entomologists worked during 1956 in selected coconut-growing areas in India, South East Asia and East Africa, one searching for diseases that might attack the beetle, the other for predators and parasites.

A third entomologist completed for

* Secretary-General, South Pacific Commission.

** Listed on page 6.

The Chairman, Mr. N. A. J. de Voogd (left), taken at an informal moment with the Secretary-General of the Commission, Dr. Ralph Clairon Bedell.

the Commission a valuable two-year study on the ecology, damage patterns and control methods of the rhinoceros beetle in Western Samoa. His report will be published shortly in the Commission's Technical Paper series.

Fisheries Activities

The Commission's fisheries officer, Mr. H. van Pel, visited six more Pacific territories during the year to advise on their fisheries problems.

Interest is growing in fish farming in the region. Ponds are being stocked with *Tilapia mossambica,* a fast-growing edible fish of tropical origin that thrives in fresh, brackish or salt water, and provides a plentiful and cheap source of protein. Tilapia production in the Commission's experimental fish ponds at Port Laguerre Farm School is roughly estimated as being 3,000 kilogrammes per hectare per annum. Other fish under observation in the Commission's fish ponds are *gourami* and *sepat,* which were flown from Manila to New Caledonia in 1955.

Plant Introduction

The Commission considers of major importance the introduction to Pacific territories of new crops of economic value.

New plant introduction stations are being established in the region, and to encourage further the proper introduction of plants throughout the Pacific islands, the Commission approved the appointment of a plant introduction officer in 1957. He will concentrate on the introduction of plants of economic importance to the area, such as cocoa, coffee, pepper, root and green vegetables, and bamboo.

As a special assignment he will study the possibilities of extending the present short season of yield of breadfruit in most islands through the introduction of strains bearing at different times of the year.

New Bamboo Project

The Commission accepted with appreciation a grant by the Maria Moors Cabot Foundation of the United States to co-operate in making a botanical survey and ecological study of bamboo in the South Pacific. In vast areas of South East Asia bamboo is put to hundreds of uses, mainly domestic and agricultural, and its similar potentialities for Pacific island peoples will be studied during 1957 by an expert from the Foundation, Dr. F. A. McClure.

Mosquito-Borne Diseases

The Commission's programme in mosquito-borne diseases will be continued. Further visits to territories for field research and advice on mosquito control problems will be made upon request. Dr. M. O. T. Iyengar will continue research work in this programme with possible additional assistance from the World Health Organization in 1958.

Nutrition

During 1956, a basic survey of food habits and nutritional status was conducted in Papua, New Guinea and Netherlands New Guinea. The study was made by the Commission's physician nutritionist, Dr. H. A. P. C. Oomen, and Miss Sheila Malcolm, dietician-nutritionist, whose services are made available to the Commission by the Food and Agriculture Organization. The complete report of this work will appear soon in the Commission's Technical Paper series.

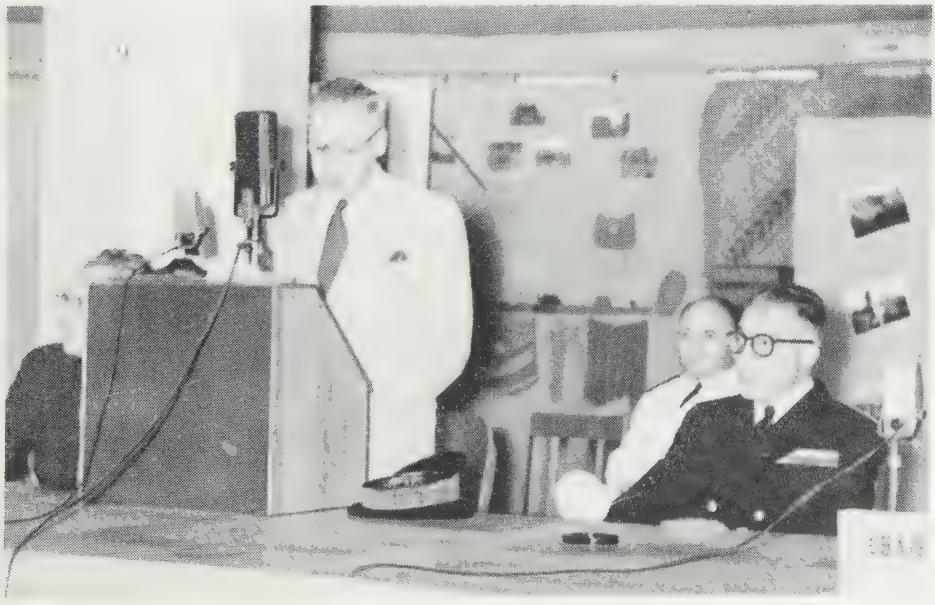
Work in the nutrition programme during 1957 will be concentrated in those Pacific island territories from whom requests are received.

South Pacific Literature Bureau

The Commission reviewed the work of its Literature Bureau, set up five years ago to stimulate the supply of reading matter for islanders.

In the past two years over 250,000 copies of books and pamphlets, in 43 titles, specially written for islanders, have been produced for Pacific island

(Continued on page 38)



The Chairman addressing the sixteenth session at the opening on October 18. Seated on his left (foreground) is His Excellency, M. Grimald, High Commissioner of the Republic in the Pacific Ocean and New Hebrides, Governor of New Caledonia and Dependencies.

Dr. Bedell briefly addresses trainees before formally declaring the Training Course open. Seated on his right is His Excellency the Governor of New Caledonia, M. Grimald.

Fisheries Training Course Opens In Noumea

A new method of working for the South Pacific Commission that could have great significance for the future of Pacific island peoples was inaugurated at Commission headquarters in Noumea on November 19 last by the Secretary-General, Dr. Ralph Clairon Bedell, when he formally declared open the South Pacific Fisheries Training Course. It is the first of a series of courses that the Commission plans holding to train islanders in practical ways of helping their own peoples.

TWENTY-FIVE trainees from fourteen territories are attending the thirteen-week Course, some having left their remote islands for the first time and flown many thousands of miles to Nouméa to participate.* They have come from as far afield as Netherlands New Guinea in the east to Tahiti in the west; from Guam, the Caroline and Mariana Islands north of the equator, to the Cook Islands and Tonga in the south.

The Course is being held under the direction of Mr. H. van Pel, the Commission's Fisheries Officer. The Food and Agriculture Organization is actively co-operating by providing a co-Director, other expert personnel, portion of fares, and equipment for demonstration purposes.

Co-Director for the first part of the Course was Mr. Hilmar Kristjonsson, an Icelander who is Chief of FAO's fishing gear section. Following his return to his headquarters in Rome on November 29, an FAO fisheries training specialist, Mr. P. Lusyne, became co-Director.

The services of Mr. A. N. Swinfield, an Australian naval architect from Sydney, were also provided by FAO.

The Government of New Caledonia and the French Institute of Oceania are actively assisting. Both are providing lecturers, while the Institute is making available its research vessel, *Orsom III*, for training cruises.

Formal Opening Of Course

The formal opening of the Course took place at Commission headquarters on November 19.

In a brief welcoming address the Governor of New Caledonia, His Excellency M. Grimald, told students it was his sincere desire that the island peoples should profit fully from the Fisheries Course, in which France was happy to participate through the services of its technicians and research workers.

"I have glanced through the syllabus and am amazed at its diversity," he said. "Apart from general lectures, I see that there are many practical demonstrations and expeditions out to sea. To instruct men from many diverse and scattered territories in the basic notions of fishing and activities connected with it, such is the aim of this Course which has brought together twenty-five students who will, in their turn, teach their brothers the knowledge they have gleaned from these lessons with a view to improving their living conditions."

In a brief address to trainees before declaring the Course open, the Secretary-General of the South Pacific Commission, Dr. Ralph Clairon Bedell, told them that the Commission's purpose in arranging the Course was to train them in a useful, practical way of helping their own people. "Pacific islanders," he said, "have long been famed for their interest in fishing. Now we shall see that interest blossom forth under the guidance of technical experts to bring to the people of the Pacific the fish that are so badly needed in many of the islands."

Dr. Bedell told trainees that they represented some three millions of people living in the islands. "We hope," he said, "that when you return home to spread the knowledge you will have gained here, the lives of all in some degree may benefit."

FAO'S Task To Expand Food Production

In introducing the co-Director of the Course, Mr. Kristjonsson, Dr. Bedell observed it was eminently appropriate that the Food and Agriculture Organization should contribute its technical skills and assistance to become the agency associ-

Mr. Kristjonsson of FAO, co-Director of the Course, told trainees he expected to learn much from them, as well as to teach them modern methods of fishing.

* A list of trainees and instructors appears on page 10.

ated with the Commission in the conduct of the Course.

Mr. Kristjonsson told the gathering that the main objective of the Food and Agriculture Organization was to expand food production in the world. It did this primarily by acting as a clearing house of technical knowledge—to facilitate the transfer of technical "know-how" from where it existed to the areas where it was lacking.

Mr. Kristjonsson said it was well known that South Pacific islanders were excellent seamen and born fishermen. "The participants of this Training Course," he said, "have brought with them knowledge of fishing practices in their respective islands which in many instances are unknown in other parts of the region. No doubt valuable exchange of knowledge and experiences will take place among the students themselves, and I for one certainly expect to learn a lot from them."

Mr. Kristjonsson pointed out that at the same time, socio-economic changes in the region were bound to bring it under more intense economic pressure, making imperative the use of modern equipment and methods of catching and curing fish. "During the Course," he said, "we shall review modern fishing methods in the light of the natural and economic conditions existing in the South Pacific islands—to study how they might best help to improve efficiency, how they may have to be modified to suit local conditions, and how they can best be introduced."

Background Work By Commission

The considerable amount of background work carried out in fisheries by the Commission since the Pacific Fisheries Conference was held at Nouméa under Commission auspices in 1952 was reviewed by Dr. A. H. J. Kroon, Executive Officer for Economic Development. "The appointment of a fisheries officer to the Commission, and the holding of a Pacific fisheries training course, were two main recommendations of that Conference," he said. "Now both have become fact."

Dr. Kroon went on to stress the tremendous long-term value to the region of such a Course. "So far the

Dr. A. H. J. Kroon, who is in charge of the Commission's work programme for the economic development of the region. Fisheries are included in this field.

Commission has sent its experts to the territories and they have done excellent work," he said, "but now we have come to a new, and, I dare to say, a more promising activity. In addition to sending experts out into the region to advise the people we are gathering the Pacific islanders themselves together for basic instruction. Afterwards, they will go back to their own territories sufficiently qualified to instruct their own people in ways of developing their own fisheries entirely by their own efforts."

The many aspects of fisheries that would be covered for trainees were reviewed by the Director of the Course, Mr. H. van Pel. These include boat building and maintenance, marine engines, navigation, fishing equipment, fish breeding, oyster culture, fish preservation, fisheries management, the shell industry and protection of marine resources.

"Instruction in all these various branches of activity will be given to you in a simple way," he said, "so that it will have real practical value."

The purpose of the Course centres on subsistence fishing for Pacific Island peoples.

"Each of you," he said, "should return home better able to do subsistence fishing for your own people because you have been here." He pointed out the importance to each trainee of learning how to get others to do better work in fisheries. "No matter how much experience you have had it is always possible to learn something from each other. This Course will help us to share our experience with experts."

Mr. H. van Pel, Fisheries Officer to the South Pacific Commission, is Director of the Course.

Twenty-five trainees from fourteen Pacific territories, all of them Pacific islanders except one, are attending the Course. This picture shows them listening to addresses during the Course opening on November 19.

FISHERIES COURSE TRAINEES

Below are listed names of trainees and territories they are from, with a brief note on experience in fisheries of each.

AMERICAN SAMOA

SUNIA, Take Aitofele

Duties as police officer include control of Japanese fishermen and security of vessels. Desires to train in fisheries in order to assist in teaching Samoans off-shore fishing to supply local cannery. Cast net, trolling, rod and line, shark fishing.

TU'ITU'I, Lea

Worked for two years aboard motor vessel "Samoa." Village fishing, handline, trolling, shark fishing, bonito fishing, rod and line, fishing with torchlight, cast net. Wishes to train in order to assist in teaching Samoans off-shore fishing to supply local cannery.

BRITISH SOLOMON ISLANDS

KELISI, Mariano

Previously employed by trochus store. Handline, diving and spearing, trochus diving to 30 feet, seine net fishing.

NIOLO, Nelson

Handline, diving and spearing, trolling.

COOK ISLANDS

POWELL, Ronald

Served apprenticeship with English boat building and hardwood yacht joinery and shipwrighting firm. Worked commercial fishing and as boatswain, mate and captain of fishing yachts and commercial sailing vessels. Built own launch and operated as part-time commercial fisherman in Cook Islands. Assisted with development of fish ponds in Cook Islands. Able to navigate using sun and star sights. Experience with native subsistence fishing in Cook Islands.

MARSTERS, Ioapa

Has been engaged in native subsistence fishing in Cook Islands. Handline, diving and spearing, trolling, reef fishing.

FRENCH OCEANIA

DOOM, John

Previously occupied in oyster culture. Drag net, handline, diving to 10 feet.

GUAM

De LEON, Francisco P.

Seven years' experience as fish weir operator, throw net, pole fishing and spear fishing.

NETHERLANDS NEW GUINEA

IPSEN, Gerard Pieter

Formerly Assistant Mate o/b M.V. "Hollandia"—experimental longline fishing. Longline, trolling, trawling, beach seine, handline, drift net, lift net.

WEASU, Thomas

Handline, trolling, beach seine, wing traps, drag seine, bottom traps, lamp fishing with seine.

NEW CALEDONIA

APIKAOUA, Marcellin

Handline, cast net, scare line, trolling, diving for trochus, lobsters.

DIELA, Joseph

Handline, spearing, reef net, trolling, trochus (diving to 27 feet).

BOUANOU, Benjamin

Mainly trochus fishing (diving to 20 feet); cast net, trolling.

NEW HEBRIDES

TAITAS, Willy

Handline, beach seine, cast net, trolling, trochus (diving to 13 feet).

NIUE ISLAND

PEAUVALE

Handline, diving and spearing, flying-fish fishery.

PAPUA AND NEW GUINEA

BER, David

Occupied formerly in village fishing. Handline, reef net, trolling, beach seine.

LAHUI, Tau

Occupied formerly as co-operative inspector, specializing in fisheries; fish preservation, trolling, longline, reef net and beach seine.

EKO, Aufa

Gill net, handline, beach seine, rod and line.

SONGAT, Amos

Gill net, trolling, handline, spear fishing, trochus and green snail-shell fishing (diving to 20 feet).

NDRETA, Pranis

Formerly occupied in village fisheries. Handline, reef net, trolling, trochus and green snail-shell (diving to 15 feet).

KINGDOM OF TONGA

FOTOFILI, Vai

Formerly master fisherman before becoming foreman and studied navigation from 'Isileli Fotofili, who has a mate's ticket. Helped in planning and construction of fishing station, fishing gear, boats, etc. Experimentation with fishing gear and methods of fishing.

TRUST TERRITORIES OF THE PACIFIC ISLANDS

DIAZ, Antonio L. G. **(Mariana Islands)**

Daily reef fishing for two seasons. Pole-fishing tuna; underwater spear fishing (diving to 20 feet).

MAD, Kenzi **(Palau Islands)**

Handline, fish traps, spear fishing, scare fishing, trolling, surround net, torchlight, trochus (diving to 20 feet).

TOSHIRO, Paulis **(Caroline Islands)**

Handline, trolling, cast net, gill net, rod and line, trochus fishing, 60 ft. pearl shell diver.

WESTERN SAMOA

AU'UAPA'AU, Simaile

Many years' experience in local fishing—several methods. As police officer from 1932-49 was responsible for control of illegal fishing. Nets, lines, spear diving (to 45 feet).

FISHERIES COURSE INSTRUCTORS

South Pacific Commission

Name		Subject
H. VAN PEL	Fisheries Officer.	Preservation of fish, fish-farming, navigation, conservation and protection, knowledge of fish and molluscs.
C. G. JOANNIDES	Co-operatives Officer.	Co-operatives and marketing.

Food and Agriculture Organization

H. KRISTJONSSON	Chief, Fishing Gear Section, Technology Branch.	Fisheries materials.
P. A. LUSYNE	Fisheries Officer.	Fishing gear and fishing operations.
A. N. SWINFIELD	Naval Architect.	Boat building, marine engines.

French Institute of Oceania

M. LEGAND	Marine Biologist.	Biology and ecology (fish).
R. GAIL	Marine Biologist.	Biology and ecology (molluscs).
H. ROTSCHI	Oceanographer-physicist.	Physical oceanography.

Government of New Caledonia

J. A. M. LIGONIE	Head of Maritime Inscription Administration, and Head of Mercantile Marine Department.	Navigation and chart reading.

Right: Students netting tilapia fingerlings in an experimental fish pond at Port Laguerre Farm School, for transplanting to natural ponds on nearby farms. Mr. van Pel, the Commission's fisheries officer (centre, wearing gumboots), is supervising the operation.

Centre: A part-grown gourami, displayed by Mr. van Pel, was part of the haul.

Below: The second fish pond at Port Laguerre being drained. In the centre foreground trainees are netting the outflow resulting from removal of the sluice, which other students are cleaning on the bank, at right.

Fisheries Training Course Mid-Term Report

January 4 marked the close of the seventh week of the thirteen-week Fisheries Training Course now being held at South Pacific Commission headquarters. Progress made in the first half of the Course is reviewed below by the Commission's fisheries officer

H. VAN PEL

WE are now in the middle of the Course, and progress so far has been very satisfactory. It is remarkable how the students, some of whom have never before been away from their islands, have adapted themselves to their new surroundings. Among the 25 trainees several languages and many nationalities are represented. However, they all share a common love for the sea and a keen interest in fishing, and all have settled down happily.

The Course is being held in a detached wing of the Commission headquarters building which has been specially converted for the purpose into lecture hall, lounge and dining room, and bedrooms. Here the trainees attend lectures, take their meals and sleep, all under the one roof.

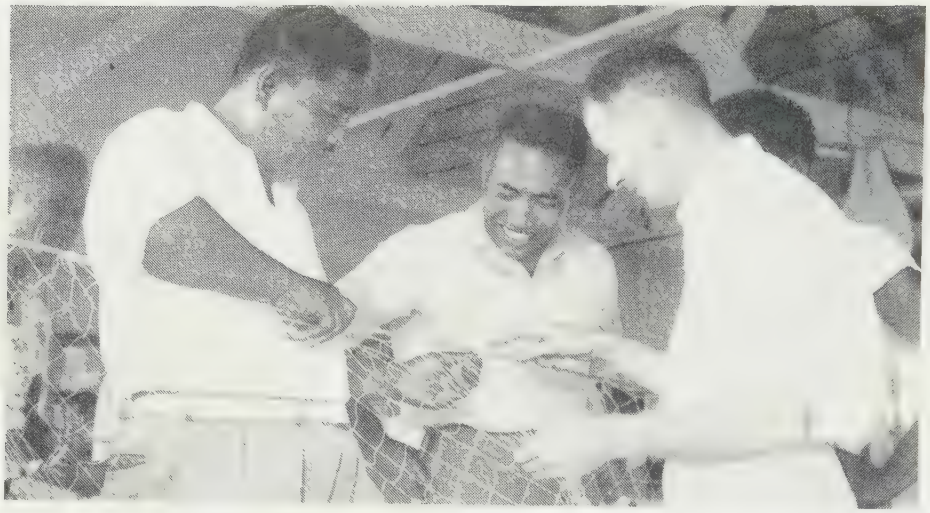
For recreation there is ping pong, billiards and swimming, while in the evenings there is usually a group of trainees harmonizing island songs to the strains of a guitar, mouth organ and ukelele.

Most of the students are excellent at writing and sketching. (In passing, it is remarkable that several of the best at drawing were self-taught.)

Their Fisheries Course training has been strongly practical. At the beginning many were unable to make a simple net. To-day all can knit not only rectangular nets, but other more complicated shapes as well. Recently, they started on the mounting of nets on cork and lead ropes, and have shown good progress.

When the Course opened most of the students were not experienced in boat

(Continued on page 49)



Top left: Mr. P. Lusyne, FAO fisheries training specialist, demonstrates a point in net making.

Centre: Mr. van Pel explains to trainees how fish in slatted crates submerged in the harbour are transferred by scoop net to wheeled seawater tanks for delivery to the nearby fish market.

Bottom left: At the Noumea fish market a student displays a live Bec de cane, a popular eating fish.

Mr. Arthur Swinfield gives students a practical lesson in boat repairing.

For the later benefit of Radio Australia listeners, Mr. Reginald Drake of the Australian Broadcasting Commission interviews Mr. van Pel on the main points of fish farming.

Ioapa Marsters, who assisted in the transplanting operation, holds some of the pearl shell planted in Rakahanga lagoon in 1955 by Mr. van Pel, Fisheries Officer to the South Pacific Commission.

Pearl Shell Transfer In The Cook Islands

Last September an experiment took place in the Cook Group that could prove of great commercial significance to all Pacific islands where suitable conditions exist for the growing of pearl shell. It was the transplanting of some two thousand live pearl shells from Manihiki to Pukapuka and Rakahanga lagoons. The transfer was made under the supervision of Mr. Ronald Powell, of Rarotonga, who describes below how it was carried out.

By RONALD POWELL*

THE very lucrative pearl shell industry of the Cook Islands is centred on the lagoon island of Manihiki. As this small atoll has yielded nearly £500,000 during the last five years, it seemed worth while to find out whether pearl shell could be grown in other atolls of the Cook Group. In the latter there are over 120,000 acres of lagoon water, much of which could be suitable for growing pearl shell, trochus or sponges.

It is known that the Japanese have transplanted pearl shell successfully. Once established it needs only a minimum of attention, while it yields a handsome reward for the man with the physique to dive to the required depth. The price of pearl shell has risen steadily during the last ten years, due to a universal shortage of shell, for over-fishing seems to have depleted most of the world's pearling beds. The trochus shell industry seems to have run a parallel course.

* Marine Division, Department of Agriculture, Cook Islands Administration.

Above: Two Manihiki divers wearing wooden goggles show typical clusters of pearl shell. These shells were brought into shallow water a few days before the "Charlotte Donald" arrived. Right: Loading the shells under water into half-drums, which were then brought ashore.

Above: The shell was re-packed into other drums, each of which was covered with palm fronds and carried across the island. At this stage the shell had to travel in a minimum of water. Right: When the ship arrived the drums, which had been sunk in shallow water on the outer reef at Manihiki, were rowed out to the ship six at a time for loading.

Very little is known about past transfers of live pearl shell in the South Pacific region, though it is well known that Lever Brothers *did* transfer some gold-lipped shell from Torres Straits to Suwarrow Lagoon early in the century. Although this venture was not a financial success at the time, due to a devastat.ng hurricane and a World War, the shell did survive, and some excellent gold-lipped shell has been fished there last year.

Little information is available about the methods used for this successful transfer over such a distance. All other attempts within the Group have failed, mainly because the distances are too great to carry the shell without a continuous sea-water circulating system.

During September 1956 I carried out a transfer of live pearl shell (*Pinctada Margaritifera*) from Manihiki to both Rakahanga and Pukapuka, at the request of the Cook Islands Administration. Mr. van Pel of the South Pacific Commission was to have carried out this work during the time he was in the Cook Group in 1955, but it was not found possible to arrange for a suitable local vessel to make this passage in the course of a normal trading voyage. He did, however, transfer some 300 shells across to Rakahanga by keeping the water continuously changed by draw buckets.

Continuous Sea-Water Circulating System

When he left the Group he gave instructions which later enabled us to construct a tank fitted with six wire-netting trays, and the pipes and valves required to keep sea water in circulation. Several difficulties were encountered, and the final fitting had to be left until we were sure of the particular vessel which could carry this gear. Three times it was all assembled during the following year but each time the vessel was re-routed.

Finally the *Charlotte Donald* of Messrs. A. B. Donald Ltd. was due to sail on this route, and the tank and fittings were installed aboard her. The owners were unwilling to have holes bored through the ship, so the pipes, tank and engine were all installed with blocks and wedges. The gasoline engine, direct-coupled to a centrifugal pump, was installed three feet above the deck and a cover made to protect it from rain and spray. The intake pipe was finally braced against the side of the ship with wires leading fore and aft. This was all made up so that it could be re-assembled in Manihiki.

There was still some doubt about the large area of copper sheathing which covered the bottom of the ship. It was known that small quantities of copper could kill pearl shell, but it was a risk which had to be taken. (We found after only four days' immersion alongside this area of copper that the galvanized pipe became badly pitted, while the flexible wire and galvanized fittings were so corroded they had to be discarded.)

We called in at Palmerston Island on the way north, and I was fortunate in having Ioapa Marsters with me for the duration of the passage. (We are now attending the South Pacific Commission's fisheries training course in Nouméa.)

Then, when everything was ready, an epidemic of influenza laid the people of Manihiki low, and it seemed for a while there might be no one available to collect the pearl shell from the lagoon in time. It was not until a few days before the arrival of the *Charlotte Donald* that enough small shell could be collected and stored in shallow water against the arrival of the ship. This was done by people of the villages of Tukao and Tauhunu.

Particular care had to be taken in collecting shell for this transfer. Normally shells are torn off the rock without worrying about any damage to the foot hairs, or byssus. However, once the latter is badly damaged it is unlikely that the oyster will be able to re-attach itself before it dies.

The shells we selected varied in size from about three to five inches. Shell was chosen which was still firmly attached to pieces of dead coral, tridacna shell or another pearl shell.

Further Consignment To Rakahanga

As the *Charlotte Donald* was making another passage across to Rakahanga we took the opportunity to transfer a further consignment of shell across, as Mr. van Pel had done. We were very keen to see how the shell he had planted had survived the past twelve months. Rakahanga Lagoon is quite different from Manihiki, although the two islands are only about thirty miles apart. Being almost landlocked there is not the same flow of water through it and the general appearance of the coral, fish and marine life is quite different.

The local people were not very optimistic about the chances of success of this transfer, and were offered so many conflicting opinions, all in good faith, that it became obvious that we would have to make our own survey. It was with some doubt that we looked for the first shell. Two local divers were engaged and, wearing their small wooden spectacles, they swam down quite easily in the chosen area.

Their first effort was successful, and they brought up a stone from ten fathoms which had three quite large shells attached to it. These had nearly doubled in size in the past twelve months.

As by using a waterbox it was not difficult to follow the movements of these divers in the clear water after the first dive, we were content for them to

point out the other clusters of shell, which all showed healthy growth. They spent some time looking for shells which might have died. These generally show up well in clear water, but they could find none at all.

We planted a further 380 shells in this same area, which varied in depth from six to ten fathoms. When we returned to Rakahanga village later we found the people were very interested in these results. They will keep us informed when the first young shell is noticed in the area.

The Transfer From Manihiki

We returned that night to Manihiki and the following morning at daybreak started to get our gear assembled. The best of the young shell was loaded into half-drums slung on poles, each being carried by two men across the island. Here the shell was again submerged in shallow water until it could be carried out over the reef to the ship.

On board, the pumping gear was rigged, the tanks well scrubbed out, and finally the shell brought aboard and loaded into the six trays. Full, the tank held about 1,200 shells. A further 400 were carried in the half-drums, which we stowed alongside the large tank. With each roll of the ship the surplus water in the tank overflowed, and by changing the drums round continually we kept the water fresh in them too. The motor ran well for four days, being stopped only for re-fuelling and oil changing.

At Pukapuka the shell was sent ashore in the half-drums. Fortunately the reef landing was good, and the shell was all carried in and left in shallow water overnight.

The following morning two whaleboats were manned and the shell was loaded into six half-drums in each boat. At this stage it was practically impossible to keep the water changed but the drums were covered over with palm fronds and the boats rowed to an area near Motu Ko.

This place was selected as being the most sheltered spot the Island Council members could find, but it has very poor bottom for planting shell. The lagoon is deep, from ten to twenty fathoms in parts, but there are large patches of brittle coral which has overgrown the Tridacna clams in many places.

A compromise had to be made, and with the help of a Manihikian diver we finally located some good ground where there was plenty of dead coral and shells and Tridacna clams already growing. The shell was planted in depths of from six to ten fathoms. Out of about 1,600 shells, only four failed to survive the passage.

Pukapuka has always had good yellow shells, but they always grow singly and are so uncommon that many of the natives did not think they existed at all. I understand that shell had been worked in this lagoon at the beginning of this century, but whether it died out from overfishing very small beds or was destroyed by a hurricane is not known.

If the shells we transplanted take hold and survive the next twelve months they may form the nucleus of a pearl shell industry for the island. Naturally, however, it will take many years before they can be fished commercially.

The author making the connection between the sea water intake pipe and the pump by a length of 2-inch armoured suction hose.

Trial Trochus Planting Also

Mr. van Pel has also recommended a trial planting of trochus shell in Aitutaki, where the lagoon is apparently too shallow for the growth of pearl shell. At the time of writing, arrangements have been made to transfer an experimental batch of trochus to Aitutaki by air. If this first test is successful more will be added later, and a colony established.

Our tests have shown that trochus shells can withstand forty-eight hours out of water. Transferring them from Fiji to Aitutaki should not be very difficult. We look forward with keen interest to this next transfer, which may mean much to the Cook Islands.

Above: After the first tray had been placed in the tank the latter was filled with shell, which was kept just awash with sea water. Right: When the last tray was loaded the water was allowed to rise to the top of the tank and the bottom valve was so adjusted that a steady flow of water passed downward through the trays. Along with the overflow from the top caused by the rolling of the ship, it was then directed into the extra drums shown in the bottom right-hand corner. The palm fronds at left were brought from Manihiki to cover the tank.

Mechanized Rice Growing In Netherlands New Guinea

Heavy trees were cleared with a bulldozer or were winched out of the ground. Two bulldozers dragging a steel cable between them cleared lighter growth.

A mechanized rice-growing project designed to make Netherlands New Guinea self-supporting in rice is under way at Koembe, near Merauke, in the south-east part of the territory. Results from experimental planting of 1,000 acres will determine whether or not the area under cultivation will be enlarged to 30,000 acres.

By J. A. LASSCHUIT*

IN Netherlands New Guinea, an ever-increasing amount of rice has to be imported each year to satisfy local demands. Last year 9,000 tons were imported, while local production was only 200-250 tons. This places a heavy burden on the country's economy, so when in 1953 the Agrarian Commission, a selected group of Dutch agricultural scientists, visited the territory in order to advise on its agricultural development, the possibility was considered of Netherlands New Guinea growing all the rice it needs for local consumption.

In the Commission's opinion the soil and climate in the south-eastern part of the territory offered good prospects. The difficulties were realised, however, of introducing large-scale rice cultivation among the natives in a short period, and so the possibilities were studied of introducing mechanization on a scale big enough to make the country self-supporting.

For mechanization, it was obviously desirable to concentrate the activities in one area, which it was felt should not be too far from transport facilities—an important consideration in this rather inaccessible country.

The Commission indicated a suitable location in the south-east part of Netherlands New Guinea, not far west of the Koembe River. It is about 30 kilometres (20 miles) west of Merauke, and about 80 kilometres (50 miles) from the Papuan border.

A more thorough investigation of this area was made by the Soil Research Service of Netherlands New Guinea, and by a Dutch development company. Special studies were made of the possibilities of mechanization, and of the water supply, which has to be adequate in case of insufficient rainfall. Along with the water supply an elaborate drain-off was planned.

1,000-Acre Pilot Project

After the preliminary studies, which included a survey, it was decided to start a pilot project on an area of 400 hectares (1,000 acres) as an introduction to a strictly self-supporting project on an area

* Of the Foundation for Agricultural Enterprises in Netherlands New Guinea.

The soil was prepared with caterpillar tractors drawing disc ploughs, disc harrows (shown here) and a land leveller.

The construction of dikes, canals and ditches is being carried out by a Dutch engineering firm using four draglines, one of which is shown here.

which could equal 12,000 hectares (30,000 acres).

Of special interest is the supply and the regulation of the water as means for weed control, which is a rather difficult question on a mechanized rice farm.

The south-east part of Netherlands New Guinea, where the project is located, consists of alluvial deposits, the land being substantially flat. Vast areas are under water for varying periods of the year, forming marshes and swamps, with a rather poor vegetation of small trees, shrubs and grasses.

In this part of the country are several big lowland rivers. On the coast the difference in height between high and low tide is five metres (15 feet). In consequence these rivers are brackish over long distances from the sea, and cannot be used for irrigation.

The climate is tropical, with a dry season from around July to October, alternating with a wet season from December to April. Evaporation of water plays an important role here, as on large areas the natural drainage is negligible, because the soil consists of fine alluvial clay and sand. For this reason full attention had to be paid to artificial drainage.

A difficulty for road building and other constructional work is the complete lack of gravel in this part of the country.

The population is rather scanty, and not accustomed to regular work. Fortunately the people have a keen interest in new things, and their level of intelligence is fair. They have been under missionary influence since 1905.

The foregoing makes it clear that it will not be an easy task to establish here a mechanized rice project on sound economic lines, but the thorough investigations have shown it seems possible with the aid of experienced personnel using scientific methods.

In order to make a trip to the rice project one has to go to Merauke by boat or aircraft. This village is situated on the left border of the Maro River. After crossing the latter, the route runs west parallel to the sea coast.

About 22 kilometres distant (15 miles) is the Koembe River. On its right bank a small railway track starts, constructed in 1955 through swamps over about 12 kilometres (7 miles) to the plant site "Kurik", with workshop, stores and residential quarters. Close to this site, two areas of 200 hectares (500 acres) each are destined as experimental "polders" (an area surrounded by dikes, with complete water control).

Artificial Irrigation Provided

As it is unlikely that the rainfall will always be reliable and adequate, means for artificial irrigation have been provided. At some distance from the polders is a larger and shallow marsh. To increase the amount of stored-up water in it an encircling dike is under construction.

The digging of a canal from this artificial lake to the polders, and the construction of a pumping station, have been finished. A drain-off system has also been prepared. The construction of the dikes, canals and ditches is being carried out by a Dutch engineering firm, using four draglines.

The pattern of the rectangular polders is regular. In the centre is the irrigation canal, and on each long side is a drainage canal. The polders are sub-divided in rectangular units of 12 hectares (30 acres), each with an irrigation and drain-

A view of the rice field, showing the first experimental crop close to harvesting.

Heavy applications of artificial fertilizer will be needed to improve the soil. To determine amounts and best time of application, fertilizer trials are being carried out on the plots shown above.

age system of its own. These units are divided up in smaller paddies.

There is also an experimental garden with small plots for experiments related to selection and fertilizing.

Mechanized Clearing, Tilling, And Harvesting

The soil was prepared with caterpillar tractors drawing disc ploughs, disc harrows and a land leveller. For clearing shrubs and light trees, a modification of the chain-clearing method, using a steel cable, proved successful. The heavier trees were pushed aside with bulldozers, or pulled away by a winch.

Harvesting will be carried out by self-propelled combine harvesters; so the fields should be fairly dry at the time to carry these heavy machines without slip. This should be possible in May or June*.

Operations began in the autumn of 1956. Early in the rainy season about 78 hectares (190 acres) were prepared and sown with rice of six different varieties.

As the growing period of rice is from 19 to 24 weeks the sowing time had to be chosen in the last half of January and first half of February. After soaking for 24 hours the seed was broadcast in a quantity of about 70 kg. per hectare (about 63 pounds per acre).

Though the area is not large for this first season, it is probable that the most difficult engineering problems have already been encountered and solved.

As to the agricultural side, it is not yet possible to give an opinion. The establishing of this rice farm upsets the natural balance of centuries in these soils. The effects of this are uncertain and can be influenced in several ways.

Heavy Fertilizing Necessary

The soil is rather poor. It is unfit to bear a good rice crop without fertilizing, and so fertilizer trials are being carried out. It is already clear that a heavy dressing of nitrogen, phosphate and potassium is essential, but the amounts and time of application have not yet been determined. Fertilizing, however, brings new problems, as it promotes weed growth.

In the dry season crop rotation will be tried, alternating with the rice crop of the rainy season. Legumes and cotton will be tested on one part, while another will be converted to pasture. Some cattle are on the way.

A small number of high-yielding rice varieties from other parts of the world have been introduced, but their suitability for Netherlands New Guinea cannot be predicted.

Pests And Diseases

Of considerable significance to the experiment is the threat of diseases, while local enemies are found among deer, hog, kangaroos, wild geese and rats (a pouched variety as well as the ordinary kind).

In the entomological field, a small bagworm (*Nymphula*) has shown up, but on well-fertilized, quick-growing rice the damage is not very important. Moreover, this pest can be controlled by applying HCH.

The problems of drying and processing of harvesting rice have been studied and an experimental plant will be constructed in due course.

The suitabilities for mechanical harvesting of the rice varieties, of the soil, and of the climate are not yet well known.

The remote situation of the project might be a disadvantage if unforeseen problems arise. Although it will always be necessary to be careful, there is no apparent reason why the experiment should not succeed. So far there have been no insurmountable problems.

A stimulating factor is the interest and the willingness to co-operate shown by the native population.

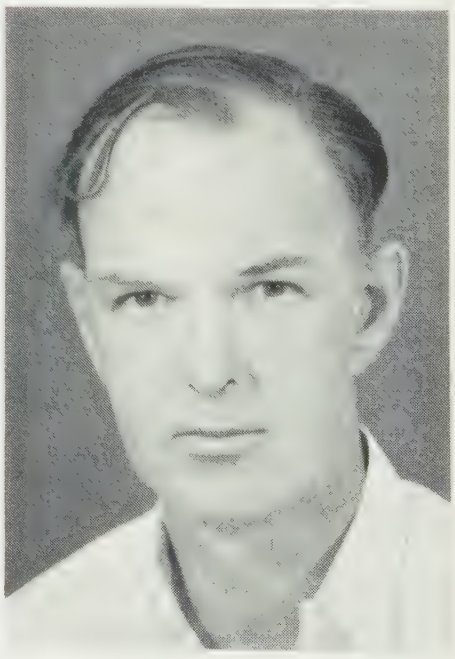
When in a few years the results of the experimental planting of 400 hectares are known and studied, a decision will be taken as to whether or not the estate will be enlarged to 12,000 hectares.

*This article was written last April. Since then the first harvest will have been taken off. It is hoped that the author will be able to supply details in a further article in the next *Quarterly Bulletin*.

DAVID COLLINS

MR. DAVID COLLINS died as a result of an accident at Dravuni, Kadavu, on January 9th. He was born in Surrey, England, in 1915, and after taking his Master of Arts degree at Oxford, came to Fiji in 1938 as an Administrative Cadet. He subsequently served in various parts of the Colony as an Administrative Officer, and in January 1955 was appointed Registrar of Co-operative Societies.

Mr. Collins is survived by his wife and four children. The funeral took place in Suva on January 10th. A firing party was provided by the Fiji Military Forces.



"Through co-operation each man gets the full reward for the work he does." This is the message that Mr. David Collins, the Registrar of Co-operative Societies, Fiji, gave as his first contribution to the South Pacific Co-operative Calendar for 1957—alas, also his last message.

A Blood Transfusion Service For The Tropics

In establishing an efficient blood transfusion service in remote tropical regions there are many problems to overcome, arising mainly from isolation, lack of storage facilities, and shortage of skilled personnel.

By J. KARIKS*

Operating theatre at the native hospital at Port Moresby, Papua.

MEDICAL needs and emergencies in the tropics are similar to those in moderate climates, but the available services are far from satisfactory. Vast areas, lack of transport, lack of adequate storage facilities, shortage of skilled medical personnel, and the low standard of general education are the main causes of the shortcomings.

The need for blood transfusion in the tropics arises frequently. Frequently also, as elsewhere, it occurs as an emergency in which a patient's life is at stake. Bloodbanks have made easy the problem of blood transfusion in emergencies in the civilized world, but similar facilities are not available in the tropics and the problem needs to be solved in some modified way. How this was done in an isolated area on Bougainville Island, in the territory of New Guinea, during the course of one year is described below.

Kieta sub-District on Bougainville Island is a fairly isolated area. There is a fortnightly plane service, and a similar service is provided by a coastal vessel from Rabaul, which lies about 300 miles distant from Kieta. The area of Kieta sub-District is about 1,500 square miles. There is a population of some 10,700 local inhabitants, plus about 70 Europeans and Chinese.

There is a central native hospital at Kieta, with 120 beds and a daily average of from 50 to 60 inpatients. During the year ending March 31 last, a total of 66 blood transfusions were given to 25 patients.

Patients were either carried in or came themselves into the hospital. Cases extremely and obviously anaemic are of great educational value in demonstrating to the local people the often dramatic improvement resulting from blood transfusions.

The organization of a blood transfusion service in the tropics differs from that in a temperate climate. This is due to several important factors common to isolated tropical areas, such as the relatively infrequent need for blood transfusion, reluctance of blood donors, shortage of adequate staff, and inadequate storage facilities.

Furthermore, hospitals in the tropics are smaller and more remote from each other, and blood transfusion is not a daily routine—though sometimes several blood transfusions are needed in one week. Sometimes, on the other hand, weeks or even months pass without any need for transfusion.

Prolonged storage of blood at hospitals is impossible as no adequate refrigeration is available. Due to different beliefs and to the tabu system, natives are very reluctant blood donors when strangers are to be the recipients. However, they easily agree to blood donation for their relatives, friends or people from their own village.

To meet these difficulties, the blood transfusion service system is based on the native village, that is, the donor and the recipient come from the same village. Without storage, the blood is transfused immediately after donation. To enable smooth service, some important preparatory work is done beforehand. In the hospital itself at least five taking and five giving sets are kept autoclaved in readiness. The same number of bottles is used. These sets and bottles, if not used, are reautoclaved every two weeks.

The bulk of the preparatory work is done in the villages. All the village population, including small children are blood grouped. The haemoglobin estimation is done at the same time. Complete records of the results from each village are kept at the hospital. The records contain information regarding the name, age, sex and village of the donor, plus all the usual technical data on his blood grouping and characteristics.

In cases when a blood transfusion is required, the patient is asked for his name, the name of the village from which he comes, and the names of his grown-up relatives. This information is compared with the records for that particular village, and a person or persons with compatible blood groups and normal haemoglobin values are sent for. Usually they arrive in hospital on the next day or the one following, depending very much on the distance from hospital and weather conditions. After cross-matching of the bloods of donor and recipient, blood transfusion can take place.

In cases of emergency the situation very often provides its own solution. Usually such patients are carried to the hospital by their relatives and friends, while some village people accompany them from curiosity. From this crowd suitable donors are selected on the spot. In more unfortunate emergencies when no suitable donors accompany the patient, hospital staff is used.

(Continued on page 38)

* Department of Public Health, Territory of Papua and New Guinea.

The "Tahiti Nui" at sea during her trials, which proved completely successful.

Raft Expedition On Round Voyage From Tahiti

To test a theory he has formulated relating to migrations of early Polynesians, the French scholar and navigator, Eric de Bisschop, with a crew of three sailed southward on a bamboo raft from Tahiti on November 8 last in an attempt to complete a round voyage via Chile, thence northwards to Peru and westward back to Tahiti. The fitting out of this expedition is described below.

By CARLOS GARCIA-PALACIOS

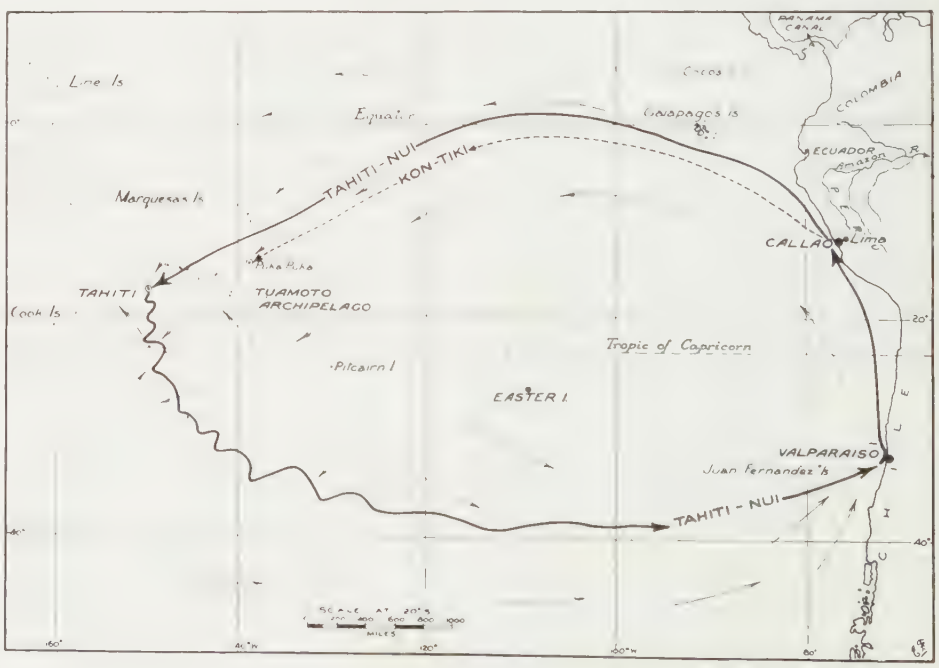
ABOUT eight years ago, shortly after the *Kon Tiki* had crossed the South Pacific, the noted French scholar and navigator, Eric de Bisschop, decided to make a round voyage by raft from Tahiti to Chile, returning by way of Peru. He thus hopes to obtain support and practical proof for his scientific theory on migrations of early South Pacific navigators travelling on primitive rafts.

Eric de Bisschop claims that in the very early days of Pacific seafaring there existed an energetic race of South Pacific navigators who, using rafts designed for deep-sea travel, were able to make repeated contact with South America. He also considers that the unquestionable similarities existing between Polynesia and South America are the result of much earlier contacts by sea than is commonly imagined.

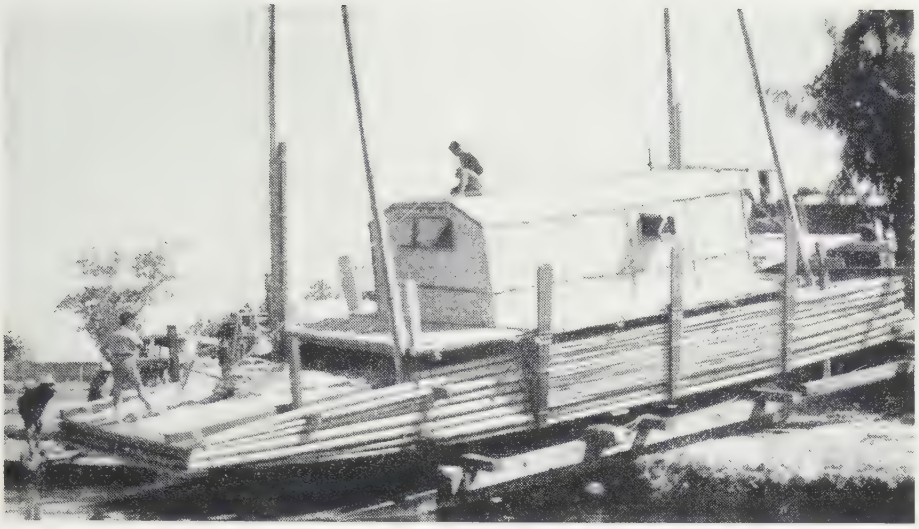
It is, however, in no way his intention to try to prove that the islands of Polynesia were peopled by the inhabitants of Chile or Peru, or that the inhabitants of the west coast of South America received emigrants from Polynesia liable to modify their racial characteristics.

His expedition has little in common with the *Kon-Tiki* crossing, which made use of the well-known winds and currents followed by navigators since the discovery of the Pacific. This time a round voyage is being attempted, setting out from Tahiti and travelling towards Chile and Peru by way of the southern route, where winds and currents are unfavourable, storms frequent and the elements combine to make of the crossing one of the most difficult exploits imaginable. It has often been claimed also that this crossing is impossible for a sailing ship with no auxiliary engine.

The scientific preparations for the voyage took several years. Eric de Bisschop studied every possible problem of navigation in an area of the world about which very little, if anything, is known;



Map showing route that will be taken by the "Tahiti Nui".



The "Tahiti Nui" being launched at the naval base at Papeete.

the maritime maps merely mention that no information is available on these distant and deserted regions. As for de Bisschop's technical ability as a navigator, it is sufficient to mention, among his many maritime adventures, his epic voyage from Hawaii to France on the double pirogue he built himself, the *Kamiloa*. Setting out from Honolulu he sailed to South Africa around the Cape of Good Hope and from there, with no stops on the way, to Gibraltar and France.

Being first and foremost a sailor, de Bisschop spent much time in examining all plans and drawings of craft which plied the Pacific several centuries ago.

His raft, the *Tahiti Nui* (which means the land towards the rising sun), was designed entirely by him. He drew up the detailed plans and himself built the model of which the final craft is an exact replica. He naturally followed historical precedents, seeking inspiration in the meagre information existing in museums on ancient South Pacific rafts.

The result, which was seen gliding along proudly in deep water during the trials, is a fine-looking, seaworthy craft. It is primarily a deep-sea raft, such as the Polynesians of old might have designed and constructed.

The building of *Tahiti Nui* was begun on 15th May last by the four members of the crew working under the supervision of Eric de Bisschop. The raft was launched on 6th September, and trials at sea took place between 29th September and 4th October. They proved successful, and no alterations were necessary.

Details Of The Raft

The *Tahiti Nui*, which is 42 feet long with an average width of 15 feet, draws barely 2 feet with leeboards up. The raft comprises a framework of hardwood to which are attached some eight hundred bamboo poles of varying length and width, to provide buoyancy. There are two big sails, made of plaited pandanus leaves. Of a total area of 540 square feet, they are supported by strong bamboo masts.

The cabin is designed to accommodate the members of the crew and protect the many delicate scientific instruments, cameras and films being carried by the expedition. It contains five bunks, radio transmitting and receiving equipment and a small galley. The cabin, which is covered both inside and out with plaited bamboo, provides complete shelter from adverse weather.

Provisions are stored in the double flooring of the cabin, and are sufficient for a minimum voyage of four months.

The main characteristic of the *Tahiti Nui*, and one of the most interesting, is the use of movable leeboards such as were used in earliest times. These leeboards (known as "guares" in Peru) are 12 in number, and are placed fore and aft in line with the raft's axis. They permit perfect balance when sailing. By using them, primitive rafts could be steered without a rudder.

No bolts or metal fittings of any kind were utilized in the construction of the *Tahiti Nui*. The lashings were made from plaited coconut fibre (nape) and puru cord. All the main wooden sections were fitted together with wooden pegs.

The raft carries a water supply of about 258 gallons contained in six barrels, each with a capacity of about 43 gallons. During the voyage the crew will also collect rain water in funnel-shaped canvas containers.

Life on board will be simple, hard and very active, each member of the crew having a specific job of work. A particularly delicate and difficult task is in store for Michel Brun, in charge of radio communications, for the *Tahiti Nui* intends to remain in contact with land by shortwave radio throughout its voyage. The French Navy, radio stations in Chile, and a powerful amateur radio

(Continued on page 27)

Captain and three members of "Tahiti Nui's" crew of four. Left to right: Francis Cowan, Alain Brun, Eric de Bisschop, Michel Brun. (Not in photograph, Juan Bugueno.)

Cacao nursery planted at Temwen Section of Madolenihmw by an adult group in a programme being conducted by an elementary school teacher.

INTRODUCTORY NOTE

This article by a 24-year-old Ponapean school teacher was originally written as a letter to Dr. Robert E. Gibson, Director of Education, Trust Territory of the Pacific Islands under United States administration. Dr. Gibson supplies the following biographical note about the author:—

"Samson was born in Madolenihmw (Metalanim) Municipality. He is 24 years old. His ancestral stock is all Ponapean. Last year he married a girl from the Municipality of Uh. He graduated from the Pacific Islands Central School in 1949 and taught elementary school in Madolenihmw. In the fall of 1955 he joined the Island Affairs Office, Ponape District, for a year's training. This is a program recently established to give the Ponape School teacher fundamental background in all aspects of political, social and economic development of Ponape District. His primary interest is to help the people of Ponape District achieve higher standards of living and self-government status."

A Project In Community Education

By SAMSON ALBERT

THIS is the story of the community education project I carried on through the elementary school in Mandalanim Municipality. Up to a couple of years ago we didn't have Ponapean material for teaching. There were no books made here for the use of our pupils and teachers; we had been using English text-books that were furnished by the former Navy Administration. Of course this wasn't a very good way of teaching, but since no books were made here, we needed to make some.

After research on what we could put into our own text-books, Mr. Halvorsen, the Educational Administrator, his staff and the Ponapean teachers made some text-books. These books were written both in English and Ponapean. However, they still didn't satisfy our need. We still thought there were many things to be put into text-books.

We were told in the summer school for teachers to try in our community to find out what the people do; how they live, and what their needs are, so that we can put this into books as material for teaching and learning.

Upon the completion of our summer session in 1953 I returned home and tried many things in my school, of which the following story is one.

Since there was no material in the Ponapean language for teaching in my school, I had my older children do something. I thought that by carrying out some activities in the community we could make up our own materials.

After some planning and discussion with the other teacher in the school, I sent my class to the homes of the people. Of course, questions were prepared for them to ask. Some of these were:

How many people are there in your family?

How do you earn your money?

How many people in your family smoke?

How much money do you spend a day?—a week?—a month?—a year?

What things do you spend your money for?

(Continued on page 46)

Samson Albert (in background) with Stewo Pelep, principal of Ponape District Intermediate School, inspecting a newly-built piggery resulting from their adult educational programme in that area.

Filariasis In The Cook Islands

Last year the Commission's specialist in mosquito-borne diseases, Dr. M. O. T. Iyengar, and his assistant, Mr. M. A. U. Menon, visited the Cook Islands at the invitation of the New Zealand Government to carry out a study there of the incidence of filariasis and to recommend methods of control. Below is an account of their investigations.

By M. O. T. IYENGAR and M. A. U. MENON

Examination of the population was made by house-to-house visits. Here a blood sample is being taken from the lady of the house who, like the great majority of people examined, co-operated readily in the investigation.

FILARIASIS is a serious problem in the Cook Islands, as it affects the health of the people and impedes their economic progress. Persons afflicted with this disease suffer from recurrent attacks of fever and progressively develop a gross enlargement of the limbs, chiefly one or both legs; this condition is known as elephantiasis or "elephant-leg".

The causative agent is a small parasitic worm which lives within the lymphatics of man. These worms produce innumerable miscroscopic young worms which circulate in the blood. When a mosquito feeds on an infected person it takes in the young worms along with the blood meal, and later transmits the infection to a new host. That is how the infection spreads from man to man.

Apart from the disfigurement, which indeed is repulsive, the enormous enlargement of the limbs and genitals resulting from this disease prevents the victims from carrying out their normal work. Moreover, persons so affected, as well as those in the early stages of the disease, are subject to frequent and often severe attacks of filarial fever, which recurs periodically. Such attacks entail misery and suffering, besides economic loss through working days lost and lowering of efficiency.

Very little is known about an effective cure for the condition in established cases of filarial disease. On the other hand, by simple preventive measures carried out through the active collaboration of the people with the authorities, it should be feasible to protect populations from the risk of developing the disease.

Special Filariasis Study

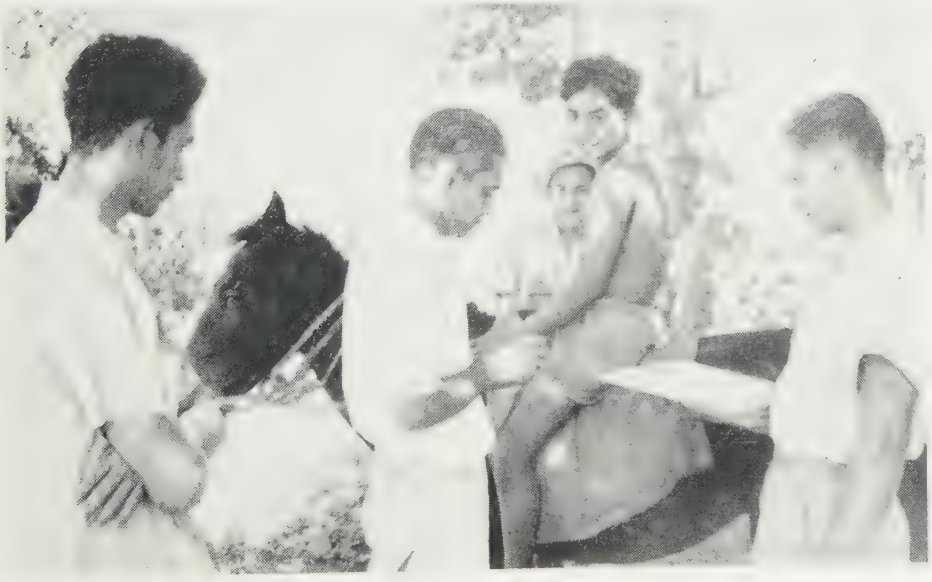
Recently, at the request of the New Zealand Government, the South Pacific Commission sent the authors to the Cook Islands to study the filariasis problem in that territory, and to recommend intensive measures for its control. We studied conditions on five islands of the Southern Group, namely Aitutaki, Mauke, Atiu, Mangaia and Rarotonga. (None of the islands of the Northern Group could be visited on this occasion.)

Inter-island travel in the Cook Islands is difficult, as it depends on the availability of boats that may happen to call for cargo. We were able to spend several weeks on Aitutaki and Rarotonga, and carried out detailed investigations there.

The investigation consisted of examination of representative samples of the population for the presence of signs and symptoms of filarial disease, collection and examination of blood samples for determining the incidence of filarial infection, examination of mosquitoes to identify the species responsible for the transmission of the infection, and studies on the habits of the vector mosquito.

Nearly 1900 persons were examined by house-to-house visits in the villages investigated. Such examinations could frequently prove both delicate and difficult, because the people could easily resent the intrusion of strangers making personal enquiries about an ailment of which the victims are often ashamed, besides subjecting them to a prick of the finger to obtain a blood sample for examination.

Needless to say, tact and pleasant



This boy on horseback on his way to collect garden produce readily consented to give a drop of blood for examination.

Left: At a demonstration given to the Aitutaki Island Council the members showed a keen interest in the live filaria worms exhibited under the microscope. Right: At a tea party given to the members of the Child Welfare Committee in Aitutaki Dr. Iyengar spoke on the filariasis problem in the Cook Islands and indicated how the Women's Committee could help in the control of the disease. Cook Islands Medical Practitioner John Mokotupu acted as interpreter.

manners are essential for the success of such investigations. At almost every house it was necessary to explain to the people the purpose of our visit, and to cajole them into submitting to the small inconvenience.

The health personnel of the Cook Islands Administration who accompanied us during our field visits gave invaluable help. We must also mention how very amiable and co-operative the Cook islanders were when they realised that the purpose of our work was to prepare a scheme for the control of this dreaded disease.

At the time of our visits to the different villages, in spite of earlier intimation being given, many of the able-bodied persons were away from home at their daily occupations. Quite often it was necessary to follow them to their place of work and examine them there, which entailed some loss of time.

High Incidence

The investigation has shown that the incidence of filariasis in the Cook Islands is high. One person in every five (taking all ages into consideration) was infected with the parasite, and one in every twenty-five showed signs of filarial disease. Among the adult population (above the age of 19) 41 per cent showed filarial infection and 12 per cent suffer from filarial disease. As such a high proportion of able-bodied persons is affected by this disease the situation deserves the serious consideration of the people and of the Administration.

The mosquito responsible for the transmission of filarial infection was determined by careful study. Known as *Aedes polynesiensis,* it bites almost exclusively during the day.

There are in the Cook Islands other species of mosquitoes which bite at night; these do not transmit the infection. The average Cook Islander has heard that mosquitoes carry filarial infection, and as a protection against the risk of contracting the disease, often uses a mosquito net at night. It came as a surprise to the people that the use of a mosquito net did not give them protection against filariasis, since the vector mosquito is active only during the daytime.

The density of prevalence of this day-biting mosquito in the villages was very high, and one in every eight mosquitoes caught in the villages was found to carry the filarial worm. It will be seen that transmission of the infection occurs continuously in these villages. It is not surprising, therefore, that the incidence of filarial disease in the population is so high.

Control Of Filariasis

Based on these studies, several recommendations have been made for the control of filariasis which are now under the consideration of the Administration. It may be pertinent to mention here the salient findings. It was found, firstly, that transmission of filarial infection occurs mainly in and around habitations, and, secondly, that the important breeding places of the vector mosquito are in the immediate vicinity of houses. This mosquito breeds in artificial collections of water like rain-water cisterns, drums used for storing water, discarded tins and coconut shells lying around houses. Although this species is prevalent even in areas far removed from human habitations, maximum harm is done only by those breeding and feeding in the vicinity of dwellings, where they have constant contact with the human population.

In the absence of a piped water supply the people resort to various ways of collecting and storing rain water for drinking and domestic purposes. These rain water containers form prolific sources of *Aedes* breeding. One of the recommendations is the provision of adequate piped water supplies to the villages wherever possible and the abolition, or proper sealing, of the existing rain water cisterns.

It is also important that the village area plus an area 120 yards around it be kept free from likely breeding places of the *Aedes* mosquito, such as tins, coconut shells, drums, etc. This is essentially a matter of village sanitation and can be achieved by the village people themselves, with the help and direction of the authorities. Community effort would play a large part in dealing with this aspect of the problem.

A small staff for each of the islands to enthuse the people and to co-ordinate and direct their efforts has been suggested. This should be backed by educative and propaganda material. A simple

illustrated pamphlet similar to the one prepared and issued for Western Samoa has been designed and handed over to the Government of the Cook Islands to be used for this purpose.

Co-operation Of People Essential

The first step would be to enlist the co-operation of the people by convincing them of the importance of carrying out the simple measures suggested in the pamphlet for preventing the breeding of the filarial mosquito. In a campaign against filariasis one often finds that the victims of the disease, conscious of the incurability of the condition, develop an attitude of cynical resignation, which in turn induces in others a scepticism and apathy towards any proposals for the prevention of the disease.

To counteract this tendency there should be a direct approach to the people. While at Aitutaki we invited the members of the Island Council to a talk and demonstration on the preventive aspects of filariasis. This was followed by another talk and demonstration to the members of the Women's Child Welfare Committee.

With the help of an interpreter, Mr. John Mokotupu, the local CIMP, the complex story of the disease was explained to the audience. They were then shown under the microscope the sinister characters in the story—the actively moving filarial worms taken from the blood of an infected person, the mosquito that carries the parasite and the manner in which the parasite enters man through the bite of an infected mosquito.

The lively discussion that followed each talk and demonstration showed how much those attending were impressed. All felt convinced of the importance and feasibility of carrying out the suggested measures, and promised hearty co-operation with the health authorities in the proposed anti-filariasis campaign.

At Rarotonga we gave talks to the hospital and the health staffs. At a well-attended meeting at the Ngatangia Community Centre, arranged by Mr. Henderson, the Adult Education Officer, an account was given of the results of the investigation and the manner in which the disease could be eliminated through community effort. Here again there was an enthusiastic reception to the idea of community effort in filariasis control. A talk was also given over the Rarotonga radio station on the same subject.

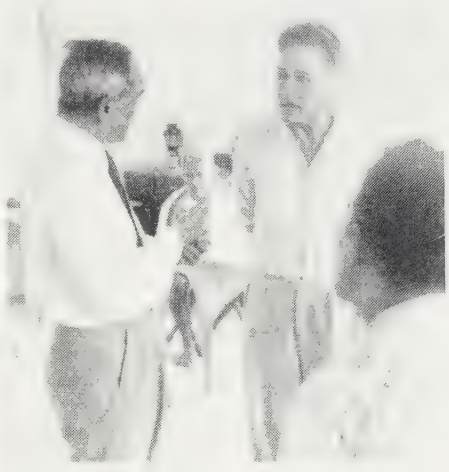
These talks emphasized how essential is the active co-operation of the people to obtain best results from the scheme for the control of filariasis.

The Rat Problem

Another factor intimately connected with the filariasis problem which also adversely affects the economy of the people in the Cook Islands is the rat problem. On many of the islands, rats cause considerable damage to the coconut crop. For example, it has been estimated that on the island of Mauke, 80 per cent of the coconuts are lost through rat damage.

Besides the economic loss, facilities are offered for the increase of filariasis. The rat eats a hole near the base of tender coconuts while still on the tree, and then consumes the kernel. The nut subsequently withers and falls to the ground. The hollow nut collects water during the rains and provides ideal conditions for heavy breeding of the *Aedes* mosquito.

Aluminium bands on the coconut trees would protect the coconuts from the ravages of rats and thereby also considerably reduce the facilities for the breeding of the filarial mosquito. These bands last a long time—for at least ten years, according to some authorities. The small cost involved in the banding of coconut trees would be amply repaid by the twofold benefit of increased coconut crop and better health.



Dr. Iyengar discusses details of the control project with two members of the Aitutaki Island Council.

It is hoped that this proposal to band all coconut trees, especially in areas where coconut plantations are in close proximity to inhabited areas, will meet with the approval of the people and of the Administration.

Raft Expedition On Round Voyage

(Continued from page 23)

post at Papeete are expected to remain in constant contact with the raft.

Photographs, and films in both colour and black and white, will be taken of the main phases of the crossing. Eric de Bisschop will publish a book of a popular nature on his voyage and, on his arrival home, will complete a scientific work on the migrations of the Polynesians containing the essential aspects of his theory which led to the present expedition.

A Widely-Experienced Crew

Eric de Bisschop's crew comprises four men with wide experience of seafaring—Francis Cowan, the two Brun brothers and Juan Bugueno.

Francis Cowan is a Tahitian married to a descendant of the famous Bounty mutineers. He is an accomplished sailor, a builder of pirogues, and was a shark hunter for more than two years in the Tuamotu Islands. Michel Brun was formerly second mate on the famous South Pacific schooner *Oiseau des Iles*, and has travelled throughout the islands in this part of the world. His brother Alain was formerly Harbour Officer at Makatea, the Polynesian island which is a centre for the phosphates industry. Juan Bugueno is a Chilean sailor who came to Tahiti from Chile a year ago and who has been teaching Spanish to the others. All know and love the sea, and are enthusiastic about the expedition.

Departure On November 8

The final departure from Papeete, Tahiti, which took place on the morning of the 8th November, was marked by a splendid and unique ceremony. Fifty pirogues accompanied the raft to the entrance of the harbour channel, close to the coral reef, where, on his double pirogue, the high priest of ancient times awaited the *Tahiti Nui*, to wish it farewell on behalf of all the Polynesians.

Then a French naval craft towed the raft into the open sea, some twelve miles out of Papeete. The sails of woven pandanus were hoisted and the *Tahiti Nui* set out alone on her great adventure, with driving, squally rain providing a foretaste of the weather she is likely to meet in the far south of the Pacific.

Until it reaches the coast of Chile, the *Tahiti Nui* will see no land and will probably meet no ships. Easter Island will be left well to the north. The raft will be completely alone, its only contact with the outside world being through shortwave radio. If this should fail, four months will pass without news from the expedition. We shall know, however, that, at least in the early part of the voyage, the raft will be engaged in daily combat against adverse winds and currents. We shall also know that a month or two after leaving Papeete, the raft will pass through very cold regions which will cause the crew to dream longingly of the gentle climate of Polynesia.

Chile is enthusiastically awaiting the courageous adventurers. Their welcome will certainly be as warm and spontaneous as the send-off given to them in Tahiti.

And France will follow the vicissitudes of this voyage in which its children set out for the unknown in the hope of contributing to the solution of one of the greatest historical mysteries of past and modern times—the true origin of the Polynesians.

Young coffee growing under shade trees on a typical New Caledonian plantation.

Problems Of Coffee Production In New Caledonia . . . (2)

In this second and concluding instalment the author continues his analysis of the problems of coffee production in New Caledonia, and summarizes what he considers planters should adopt as objectives to improve this principal primary industry of the territory.

By E. J. E. LEFORT*

Criticisms And Remedies

WATER: The main drawback in processing coffee by the wet method in New Caledonia is the lack of water. However, some rudimentary system of piping small natural springs lies within the possibilities of many producers. Since early times the islanders have irrigated their taro gardens by bringing water to the spot where it is needed. A similar practice might be applied to coffee.

The example mentioned above is the best demonstration of the fact that water, particularly in abundance, is the only means of salvation for washed Caledonian coffees.

EQUIPMENT: As a general rule processing equipment is far too elementary. As it is at present, it gives rise to insuperable difficulties in handling. The tanks could be improved by installing a system of valves and loading funnels which would facilitate emptying and cleaning. By arranging them in line or at graduated levels, water could be used to convey the berries through the processing system, right from washing to drying. Apart from the technical improvements that would thus be afforded, this system would present the advantage of causing a marked reduction in labour.

We are convinced that it can be left to the ingenuity of the planters themselves to devise their own processing centre along these general lines. The topography of their plantations will assist them in this task.

HARVESTING: Harvesting is not practised with sufficient care. A mixture of red, green and black berries should be avoided. Black berries should be harvested separately. Further, in order to interrupt the cycle of development of the borer, when the plantation consists of only one variety, each harvest should be terminated by complete stripping, leaving no fruit either on the plants or on the ground.

Moreover, the quantity harvested daily should not exceed the processing capacity, to avoid holding the berries in heaps for long periods and encouraging uncontrolled and dangerous premature fermentation.

WASHING THE BERRIES: The floating method practised in New Caledonia represents, in fact, only a part of the entire process of washing and sorting. Indeed, the earth and stones which are always present, even when harvesting has been carried out carefully, often find their way into the pulpers. A slight adjustment of the washing tank (installation of a double, perforated base) would provide a sufficient safeguard for the pulping equipment.

It is very important to make use of floating berries by preparing an inferior quality of coffee from them. The same remark applies to unripe berries.

SOAKING AND FERMENTATION: Soaking has been generally misunderstood and improperly applied. It has been confused with the fermentation process, whereas it should never be expected to do more than its name implies. Furthermore, it can only be effectively achieved provided there is a sufficient volume of water available, and this is not usually the case in New Caledonia.

Soaking as practised in the island causes fermentation of the coffee-in-parchment, thus running the risk of spoiling. Under such conditions it is easy to understand why the subsequent bacteriological action has a harmful effect, not only on the composition of the bean, but also on its appearance.

In all fairness it can be stated that on the east coast at present very little coffee undergoes less than 60 hours' fermentation. Only Arabica, when it passes to the pulper directly and without previous soaking, escapes the systematic over-fermentation.

Robusta, and even Arabica, can be submitted to fermentation in the parchment for 36 hours in clean water without any risk of degradation. If, moreover, it is considered that this period of time is sufficient to destroy the borer, it will certainly be admitted that it is both more simple and less dangerous to resume the orthodox method of preparation by the wet method, thus eliminating altogether the need for soaking.

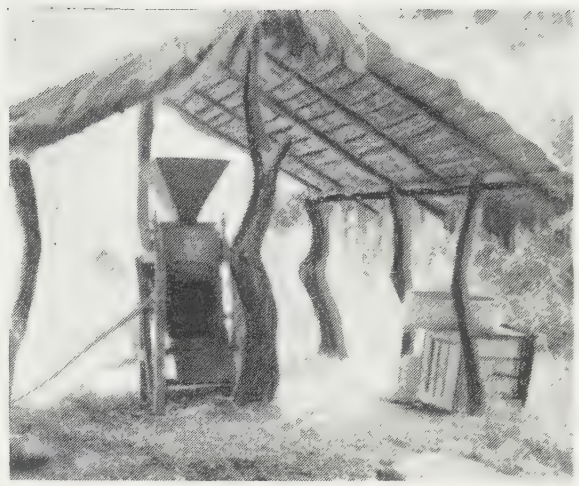
Scalding might replace soaking. It would be a useful method of destroying the coffee-bean borer, and would also obviate the risk of discoloured or evil-smelling beans. However, as it serves the same purpose as fermentation in Stephanoderes control, it is pointless to use it with the wet method.

Pieces of outer covering and non-processed small beans which escape the

* Research Officer for Economic Development, South Pacific Commission.

pulper hinder the fermentation process. They commonly produce "rusting" of the beans. When the coffee-in-parchment has been freed of its outer coverings the small berries still remain sticky, and automatically cause post-fermentation on the drying area. This drawback could be remedied by using perforated sheet steel for sorting as the coffee leaves the pulper. Subsequently the small berries would undergo further treatment in equipment specially adjusted to their size.

Fermentation in New Caledonia is either done under water or in dry conditions. The batches are hardly ever stirred or transferred from one vat to another. This means (unless, of course, the quantities treated are very small) that processing is always irregular, which naturally gives a final product of uneven quality.



Pulper in a native village; on the right are the case and basket used for fermentation.

Washing And Drying

Washing of the coffee-in-parchment is rarely thorough, since it is done in the polluted water used for fermentation. The stickiness of the beans can only be completely eliminated either by stirring or else by washing, at least in clean, if not running, water. Proper washing greatly facilitates drying operations.

The drying areas are generally too small. Because of this the layers of berries naturally tend to be too deep. Often this lack of surface area means that the coffee is packed or stored when insufficiently dry, thus causing post-fermentation. On the open area, as well as in storage, the coffee is insufficiently stirred.

Rather than using areas of cement or wood which are too small, it would be preferable to establish large areas of rammed earth, despite the slight inconvenience of rapidly washing the coffee afterwards.

Trays present an excellent method of drying, provided they are sufficient in number and can be easily sheltered.

Protection methods against rain and damp for coffee undergoing drying are far too primitive. Instead of using separate pieces of corrugated iron which afford only partial shelter for the coffee it would be far preferable to amalgamate these in the form of one moveable roof which would provide shelter for the whole of the drying area.[1] Moveable trays under a fixed roofing are also advisable.[1] Use of these methods could reduce the labour requirements of the plantations. Further, they would make it easier to attain the normal humidity rate of marketable coffee, which should not exceed 13%.

An ingenious method noted in New Caledonia consists of a small drainage area in cement, plus a larger drying area enclosed within a hut containing glass windows and vents. The solar heat is such that the duration of the drying period is considerably reduced. Apart from the fact that the source of heat costs nothing, this dryer has the advantage of producing a satisfactory output, both qualitatively and quantitatively.

Processing By The Dry Method

In New Caledonia the use of this method is dependent rather on the human than the climatic factor. Indeed, technically speaking, it would be more reasonable to use the wet rather than the dry method on the East Coast, which has a typical tropical climate. However, the apparent facility of the dry method appeals to the island population, which now processes most of its coffee by semi-direct drying on areas or trays.

Despite the unfavourable climate, dry method processing might give good results if properly carried out. Unfortunately, such is not the case on the East Coast of New Caledonia, which often produces coffees of doubtful appearance. This is caused by both insufficient technical knowledge and a certain negligence on the part of producers. It must be admitted that borer control has caused some confusion in the minds of the latter, and this has resulted in a sort of hybrid treatment which gives only badly-prepared coffee—incidentally, also attacked by the borer!

Here, as on the West Coast, soaking as a measure against the borer forms a continuous operation with fermentation, which is inadequately carried out in dirty water. This undoubtedly serves in some measure to eliminate Stephanoderes but also results in a poor-looking coffee. The use of this method of control means that preparation by the dry method has all the drawbacks of that by the wet method.

Some producers have replaced soaking by fermentation in heaps, but the results have been definitely poor. Indeed, without stirring, the berries in the centre of the mass are burnt, while the outer berries are scarcely touched. And since only a slight rise in temperature is sufficient to encourage the activity of the borer it is not surprising that this pest finds at least one spot in the pile with the right conditions for developing its destructive talents. Further, changes in the structure of the berries continue to occur during the drying period as such, and right on into the storage period.

The coffee is sometimes placed in heaps to facilitate subsequent drying (a semi-fermented berry drying more quickly than a fresh one). It often happens that this placing in heaps is simply the result of negligence and is not a deliberate part of the processing method, in which case the results are obviously as harmful as those described above.

When the layers of berries on the drying areas are either too deep or insufficiently stirred, uncontrolled fermentation inevitably occurs, producing defective beans.

The berries undergoing drying are not sufficiently protected against damp or night dew. It sometimes happens that the berries are soaked with rain and remain for days at a time in the pools of water which have formed on the unlevelled surfaces of the drying areas. Another drawback in these areas is that they are often placed in partial shade so that the berries never manage to dry out uniformly. In spite of this, planters continue to remove all the beans when the part of the layer which is in the sun is considered sufficiently dry.

Since they are easily protected, drying on trays might be effective if the drying equipment were not almost always inadequate for the size of the crop, so that fermentation is encouraged through overloading. Drying on mats is less practical than on trays. The loaded mats are difficult to handle, and give very little protection from dirt.

The dried berries, especially when the rammed earth area is used, are rarely collected together with sufficient care to

[1] "Processing Coffee Beans", by E. J. E. Lefort, *S.P.C. Quarterly Bulletin*, Vol. 5, No. 1, January 1955. South Pacific Commission, Nouméa, New Caledonia.

Above: Cemented surface for drying coffee beans, with adjacent storehouse. Right: This drying surface is partly shaded, which does not allow even desiccation.

prevent damage either to the pulpers or the final appearance of the coffee. Certain doubtful colourings in the end product are mainly produced by the colour of the earth in the drying area.

Storage generally takes place too soon and, through lack of dryness and insufficient stirring, harmful post-fermentation often occurs in the batches.

Criticism And Remedies

This subject will not be dealt with in great detail, since it has already been considered in part in the section connected with drying of coffee-in-parchment. Emphasis will be placed on the improvements most likely to remedy the main defects of processing by the dry method, as practised in New Caledonia.

Firstly, the most urgent change would be to replace soaking and fermentation, as a method of borer control, by scalding for a few minutes; this would have the added advantage of markedly reducing the drying period. It would perhaps complicate processing to a slight extent, but it would be absolutely certain in its effects and could be easily controlled. If the planter does not feel himself capable of carrying out and supervising an operation of such proportions, he will find it useful to spread the berries out on the area immediately after gathering. This process is admittedly simple, but assuredly more effective than the usual method of control, which almost always defeats the object in view because of the lack of knowledge or attention.

Scalding requires only a few metal bins, a little water, wood for heating and a minimum of supervision, whereas soaking necessitates a number of tanks, a quantity of water and immersion for at least 36 hours. Much time is also taken up in frequent stirring and constant supervision to avoid the risk of pre-fermentation. It would, therefore, seem that the method we advise is by far the most simple and rapid to obtain coffee which had not been affected by the borer. It is obvious that the few minutes' supervision required by this method of treatment is absolutely essential to avoid cooking the beans. However, it is thought that the saving in fuel would be a factor likely to encourage brief scalding.

The improvements to be made in drying the berries are the same as those recommended for drying the coffee-in-parchment.

After drying, the berries should be quickly washed so as to eliminate both heavy and light foreign matter. Brief exposure to the sun would be sufficient to evaporate off the small amount of humidity which the dry berries might have absorbed during this short operation. This certainly means a little extra work, but it would greatly help in prolonging the life of the pulpers, and would also improve the final appearance of the processed coffee.

Summary Of Objectives For Improving New Caledonian Coffee Production

A. *SUGGESTIONS FOR GROWING*

(a) Restoration of senile plantations by cutting back;

(b) rational planting of new plots with improved plant material produced through sexual processes (mass or genealogical selection) or asexual (graftings and cuttings);

(c) control of weeds by weeding, use of weed killers, mulching or cover-plants;

(d) maintenance of coffee-shrubs by simple pruning and topping, or by cutting, with a view to forming simple or multiple stems;

(e) establishment of suitable shade-plants;

(f) control of pests and diseases by using tested products and by stripping off all berries at harvesting;

(g) humic fertilizing by using manure, compost, manure crops or mulching;

(h) mineral fertilizing by using chemical fertilizers of prime importance and the major trace elements.

B. *TECHNOLOGICAL SUGGESTIONS*

(a) Practice of selective harvesting, pick-only the ripe berries;

(b) use of water in sufficient quantity both for proper fermentation as well as for water-transport of the berries through the various stages of processing;

(c) proper utilization of existing technological equipment both to reduce handling and facilitate processing;

(d) resumption of the orthodox method of fermentation with stirring of the batches, rather than soaking;

(e) thorough washing of the coffee-in-parchment to avoid post-fermentation and its consequences;

(f) improvement of the drying process by rearrangement of areas and trays, or the use of special dryers;

(g) avoidance of pre-fermentation when processing by the dry method;

(h) borer control by scalding the

(Continued on page 47)

Left: After the opening of their store, members of the Samoamoni Society discarded their working clothes, put on tapa cloth and assembled for this photograph. Right: Interior of the Samamea Branch Store of the Fagaloa Co-operative Society Ltd., showing the manager arranging stock.

Co-operative Trends In Western Samoa

By R. H. BOYAN*

ASPECTS of co-operative development in Western Samoa were described in an article entitled "Sale'imoana Story" in the July 1956 issue of the QUARTERLY BULLETIN. *It described the normal type of rural, multi-purpose trading society, and added that members had sponsored a society of the Thrift and Credit type. This indicates that co-operative development in Western Samoa will not follow a narrow pattern and this is borne out by other trends, described below.*

An Urban Society

An interesting development is the starting of an urban society which operates a retail store under the name Samoamoni Co-operative Society Ltd. Membership mainly comprises wage-and-salary earners living in Apia suburbs. The President, Mr. L. Tuiletufuga, thus briefly outlines the project:

"The Samoamoni Co-operative Society Ltd. is the first co-operative society established in the Municipality of Apia since the introduction of co-operative societies in the Trust Terrritory of Western Samoa.

"At the first meeting of the Society held in August 1955, the proposal was made to establish a trading store to help members lessen the high cost of living. The sponsors after discussion among themselves had considered it would be a good idea to have a group trading organisation somewhere in the Apia area.

"The decision to make cash contributions towards the project was also made at the first meeting. After ten months enough money had been gathered to finance the construction of a small store building. In July 1956 the construction of the building was commenced by a foreman carpenter with the members themselves contributing the labour. By the end of September 1956 the building was completed and preparations were made to stock the store. It was opened on 18th October, 1956."

To add to the President's remarks it may be mentioned that the members have confidence they will be able to pay a worthwhile rebate on purchases. This should be assisted by the opportunity of obtaining most of their stocks from the Samoatula'i Joint Co-operatives Ltd.

A Branch Store

Another development away from the normal is the opening of a branch store by the Fagaloa Society. The following comments by the Secretary, Eliapo Puepuemai, indicate why it was decided to open a second store. Eliapo says:—

"This Society has been established inside one of the most mountainous and difficult parts of Upolu. There are six villages whose people take part in this Society, but only one store. It is difficult for many of the people to deal with this store daily, because they live far from it. It is not only difficult to travel on land to the store, but it is also most difficult to travel by sea, because of dangerous entrances. People usually sent their children to the store and they couldn't return to their houses until it was dark. Also, if we happen to have guests at night we cannot supply them from the store immediately."

Various factors were responsible for the decision to open a branch store rather than split the Society into two, the main ones being to economize in capital and in management, as Eliapo would have had to be secretary-bookkeeper for both societies.

The new store is small, but very neat, as the accompanying photograph shows. It is well patronized.

Transfers From Small Traders

Two photos on the next page show the stores of the Matailiili and Fasito'outa Societies. Each building is rented from a member who previously operated the store as an individual enterprize.

In one case the owner is a planter on a fairly large scale who decided to concentrate on his planting activities, and who organized a co-operative to take over his trading interests. He is President of the Society. In the other case the owner had died and his widow, after operating the store for a time, decided to assist in the formation of a society to take it over.

By coincidence, both businesses are in the one village. This may seem undesirable, but the village is a large one and quite capable of carrying at least two societies.

Having regard for all relevant factors it would seem that a membership of 50 or 60 would appear to be the desirable size for a society in Western Samoa, and if this proves to be the case, the operation of at least two societies in one village may become more common.

* Mr. Boyan is Registrar of Co-operative Societies, Western Samoa.

Above: The Matailiili Society has followed the traditional style of trading station in Western Samoa in combining both store and living quarters for the manager. Right: The Fasito'outa Society's building indicates a newer trend, for the manager lives in his own fale away from the store.

Society That Was Too Small

An illustration of the difficulties associated with a society that is too small is given by the Tafitoala Society, which was the first to be registered in Western Samoa. The Society was formed by eleven men who originally had formed a group to assist one another in plantation work. They found that clearing and maintenance work was easier if they combined to work on each other's plantations in turn rather than independently.

They next decided they would like to have their own marketing organization, hoping thereby to obtain better prices for their produce and also to have their own retail store to serve their convenience and pockets. So over a period of several years they each contributed monthly a small sum to a common fund.

Eventually in 1955 they had enough to erect buildings. This used up all their capital, but arrangements were made to obtain stocks on credit. Within eight months this credit had been liquidated through the accumulation of surpluses, and by a limited rebate and bonus distribution at Christmas this position was maintained.

However, in common with all villagers of the area, the members had suffered severely from the effects of prolonged drought which broke only in October last, and they needed assistance from their Society by way of increased credit accounts. This imposed a serious strain on their working capital, which fortunately has now been eased by a sudden influx of new members. (But of course these members too were hit by the drought and it will be some time before they are able to pay in full for their shares.)

An accompanying photograph shows both the old and new members in front of the store building. Another shows portion of one of the members' plantations. (This may seem to disprove the fact that a recent drought had actually occurred. However, the truth seems to be that grass and weeds will live and grow while taro remains at the same size, banana bunches are much smaller than normal, coconuts are slow to mature and cocoa trees cannot carry a large number of pods.)

Cash And Credit

Mention of credit accounts indicates a departure from one co-operative principle. This has been found necessary in many cases because the practice of running accounts is very common in Samoa. However, the members of the Afega Society decided from the inception to run on a "cash only" basis, and this experiment has proved such a success that newer societies have decided to follow it. The Afega Society may have set a precedent which will strengthen the internal economy of Western Samoa.

In common with the pattern elsewhere in the world, the primary societies have formed an Association which will undertake various services for its member societies, including importing. An

(Continued on page 46)

Above: Members of the Tafitoala Planters Co-operative Society Limited, photographed soon after the membership had suddenly expanded from eleven to almost treble that number. Right: The Tafitoala Society's store is surrounded by members' plantations. The portion of one seen here illustrates a common Samoan practice of planting bananas and cocoa side by side in an established coconut plantation. In addition, in this picture can be seen a breadfruit and a pawpaw tree.

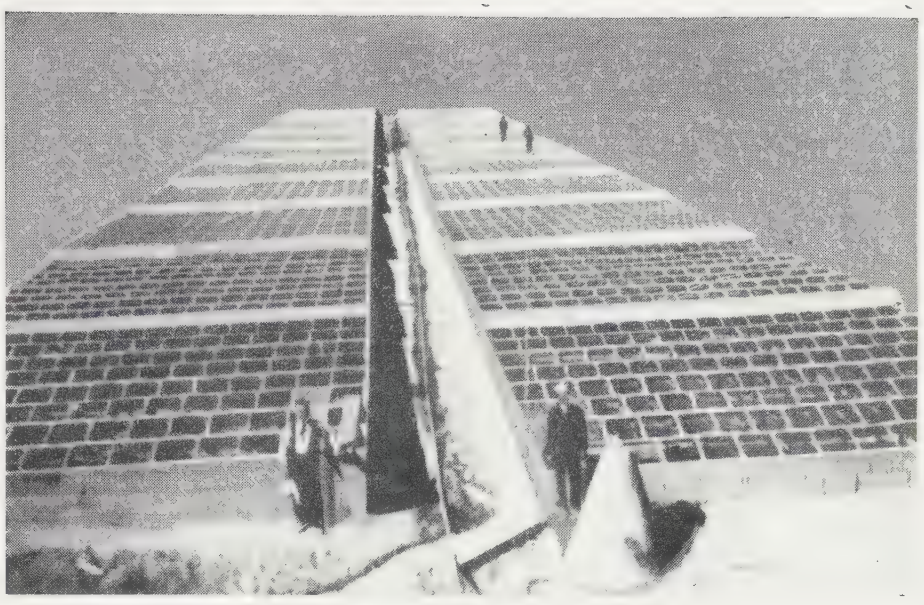


FIGURE 1. This solar still was built at Las Salinas, Chile, in 1872. Its area is 51,000 square feet; maximum daily water yield, 1 pound per square foot. The accompanying photograph of the installation was taken in 1908, after 36 years of operation (background has been retouched).

SOLAR STILLS

Ways of using solar energy for such purposes as distilling water, heating houses, and generating electricity are being studied today by scientists in many countries. To encourage their closest collaboration a World Symposium of Applied Solar Energy was held in the United States in October last. In this article the author outlines the historical background of man's attempts to utilize solar energy for practical purposes, and reviews the present status of development.

By H. MASSON*

IN dry regions of the world, water supply is a vital problem. Very often, however, drought is merely apparent, and water is to be found in the sub-soil. Unfortunately, this water frequently contains salts which render it unsuitable for consumption and irrigation. The inhabitants are thus reduced to importing fresh water, unless some means can be found for local distillation of either sea water or brackish well water.

There is, of course, the possibility of collecting rain water, but there are disadvantages where the dry season lasts for several months, while the idea is obviously impracticable where rainfall is low. The town of Port Etienne, for instance, situated on the Atlantic coast at 21° latitude north, receives an average of only 1 inch rainfall per year!

Lack of water thus restricts development of certain areas which may in other respects possess valuable natural resources. As such regions are generally exposed to intense sunlight, attempts have been made to utilize solar heat for distilling the saline waters commonly found there.

* Professor Masson lectures at the *Institut des Haute Etudes*, at Dakar. He attended the Symposium mentioned above.

Historical Background

The idea is by no means new. From earliest times solar heat has been utilized to crystallize salt by evaporating sea water or brine. The Chinese used this method thousands of years ago, and were later imitated by the Egyptians, the Phoenicians, the Greeks and the Romans. The salt thus obtained was actively traded.

Evaporation of salt water exposed to solar heat would seem to have been practised through the centuries wherever atmospheric conditions permitted. Traces of salt pans have been found in Massachusetts on the Atlantic coastline, established only twenty years after the arrival there of the first emigrants.

It should, however, be noted that, despite its long history, the process has undergone no fundamental improvement over the past 2,000 years.

On the other hand, there seems to be no evidence remaining today of methods used in past centuries for obtaining fresh water by means of solar heat, and it was not until the last century that practical experiments were made.

The first practical undertaking of any importance was that established by J. Harding in 1872 at Las Salinas, Chile, at an altitude of 4,200 feet. The area exposed to the sun measured 4,800 square metres. The water was contained in a series of shallow tanks placed side by side, each covered with a plate of glass set at a slight incline. The vapour formed under the action of solar heat condensed on the glass and ran downwards into a gutter fitted for this purpose. By this method 23 tons of distilled water were collected daily in summer (i.e. 4.8 litres per square metre of the area exposed to radiation).

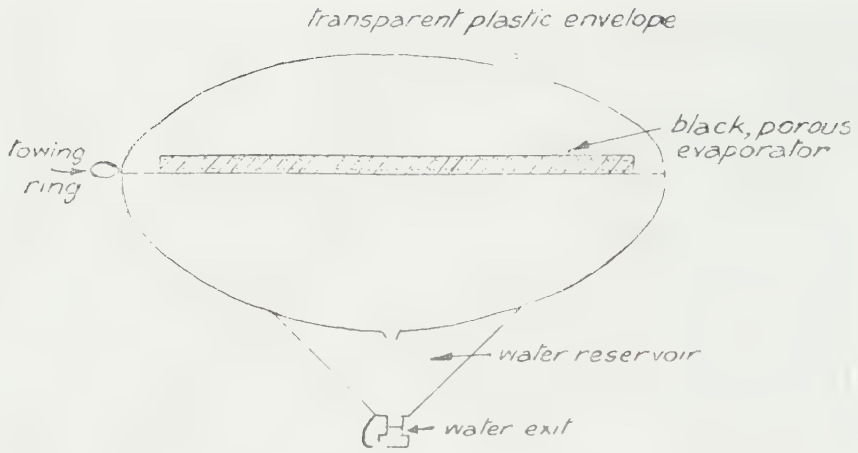
The accompanying photograph (Figure 1) gives a rough indication of the installation. It was taken in 1908, after 36 years of operation. The equipment will therefore stand up to wear.

The basic principle of this type of apparatus was to be used later by Mamain at St. Maur.

In 1926, when the Chile installation had been long forgotten, the subject again caught public attention. In that year an official competition was opened in France for the invention of apparatus capable of producing distilled water from solar heat. The purpose was, in fact, to discover some economic means of supplying water to outposts in Southern Tunisia and to the convoys compelled to travel in that area. This competition led to the taking out of a number of patents. Several small stills were constructed, but output proved to be low, and not one of the inventions was actually put into practical use.

Then came the Second World War. Long-distance flights over water became more frequent, and aircraft were fitted with rubber dinghies for use in cases of forced landings. But in view of weight restrictions only a very small quantity of drinkable water was included with emergency equipment.

The Massachusetts Institute of Tech-



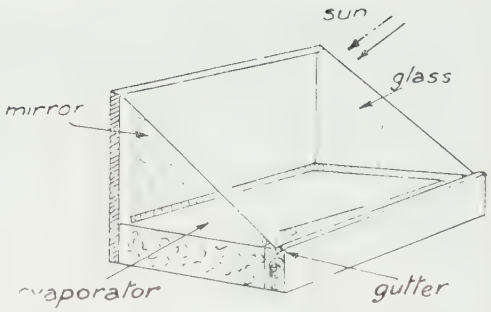


FIGURE 2 (left): Diagram of the inflatable still perfected during World War II by the Massachusetts Institute of Technology for use by crews of aircraft forced down into the sea.

FIGURE 3 (above): The simplest type of solar still—the single-frame type.

nology undertook research into the construction of a non-sinkable solar still intended to be towed by the dinghy. Dr. Maria Telkes was responsible for perfecting this apparatus. It consists of an envelope of transparent plastic material, inflated to an ellipsoidal shape (see Figure 2). A porous substance, fitted horizontally through the main axis, is soaked in sea water which evaporates under the influence of the sun's rays. The vapour formed condenses along the inner surface and runs down into a receptacle, which is cooled by sea water. The salt remains on the porous substance, and may be removed before the operation is repeated.

Since the war manufacture of this type of still has continued, and a standard model is included in aircraft emergency kits. It is capable of supplying 50 to 60 per cent. of the quantity of water to be obtained from the ideal type of still. Temperature may rise as high as 60° C.

Research continues in various countries, particularly in California, where the problem of fresh water supply is particularly serious in certain years.

Theoretical Considerations

Before reviewing present-day installations in several countries, it might be useful to add a few words about the theory of the process in order to give some idea of the various factors involved. By considering these in turn, attempts may be made to increase the output of a given piece of apparatus or reduce the production cost of the water obtained.

The process of distilling salt water may be briefly described as follows: The original water is heated, the heat supplied being utilized in turning the water into vapour. This vapour is then cooled. It condenses, producing water free of salt, while the non-distilled liquid becomes increasingly salty. Thus the essential requirements are a source of heat and a source of cold.

In the case of solar distillation the necessary heat is supplied by the sun's rays. The surrounding air can be used for cooling purposes (this being the simpler solution), or alternatively, water in direct contact with the surrounding air.

The rate of distillation will increase as the difference of temperature between the sources of heat and cold becomes greater. It is therefore advisable to accentuate this disparity as much as possible. It is, of course, possible to lower the condensation temperature, but this is scarcely practicable. For this, refrigerating equipment would be required, and in our present state of knowledge, solar refrigeration is by no means common.

Actually, present-day research is being directed towards increasing the temperature of the source of heat. It is known that by concentrating the sun's rays through a lens or mirror, very high temperatures can be obtained. By reflecting the rays with a parabolic or cylindro-parabolic mirror, the output of the equipment can be considerably raised.

Further, the transformation of the liquid into vapour can be hastened by lowering the surface pressure of the liquid. By producing a sufficient vacuum in a receptacle, water can be boiled at ordinary temperatures. If the vapour thus formed is condensed, distillation will be considerably accelerated.

Finally, a marked improvement can be obtained in distillation output by using multi-purpose vapourization machines. It is known that water vapourizes by absorbing heat, without any consequent increase in temperature. Vapour then contains "latent heat" which is turned back into the process at the time of condensation. This condensation heat, theoretically equal to the vapourization heat, is then capable of vapourizing a fresh lot of water. This in its turn restores condensation heat, and so on. It is thus sufficient in theory to produce an initial quantity of heat to set the operation in process. In actual fact, some compensation must be made for the losses which occur.

Each of these different systems has certain advantages. Let us consider the simplest—the solar still employing no special device for concentrating the rays and operating under atmospheric pressure.

The general principle remains the same. A depth of water of several centimetres, lying on a blackened and non-conducting surface, is exposed to the rays of the sun passing through a sheet of glass, which serves a double purpose. Firstly, it lets through the light and heat, giving short-wave rays which raise the temperature of the water and its receptacle. As a result, these emit long-wave heat-giving rays, which cannot penetrate the glass. This creates what is known as a hot-house effect; a blackened mass, exposed to the sun's rays through an interposing glass panel, attains a temperature higher than that which would normally have been attained if there were no screen. In effect, it is as if the sun instead of giving 1 cal./m./cm.^{2}, were giving twice as much.

But the glass serves another purpose. In receiving and arresting the calories radiated by the water and its receptacle, it grows hot, and it in turn sets up radiation. About half these rays will be emitted to the outside, the remaining half returning inward towards the water. As a result of radiation towards the exterior, the glass cools and the water vapour condenses on contact with the glass, since the quantity of water that can be contained in a given mass of air decreases with the temperature. The glass, therefore, assists in condensation and the condensation process is maintained by reason of the convection currents in the air.

Practical Considerations

SINGLE-PURPOSE STILL: Let us now examine the most simple type of equipment. The primary requirement is to absorb as many calories as possible. For

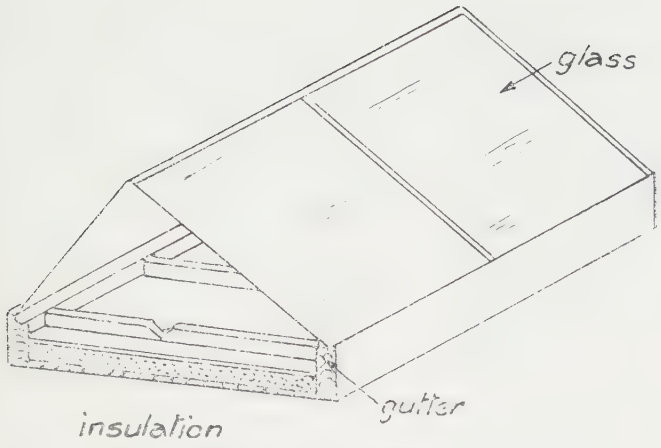


FIGURE 4: Double-frame, or "roof" type, still.

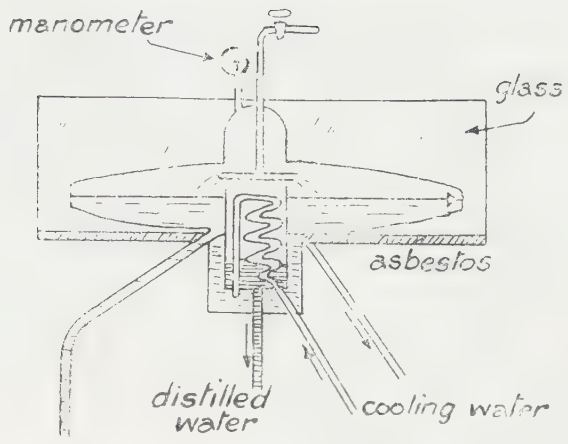


FIGURE 5. Diagram of a Pouget's vacuum type still (after J. Savornin).

this purpose the glass panel should be placed at right-angles to the sun's rays. With the standard type of apparatus, variation of the general orientation in order to increase output is out of the question. In single-frame apparatus of the type shown in Figure 3, NS orientation should be followed according to the line of the greatest slope. On the other hand, with double-frame equipment as shown in Figure 4, the dihedron should be set in an NS direction.

So far only glass has been mentioned as a transmitting material. Obviously any other transparent substance may be used, provided 90% of incident energy reaches the water when the angle of incidence is about 60°.

Moreover, it is essential that the water vapour condensed on the cool glass form a thin film. It is therefore necessary that the glass (or whatever is used in its place) be perfectly clear and of such a texture that it holds water evenly. Otherwise the water vapour forms into small drops on the inner surface, and these act as tiny reflectors, thus reducing the total incident radiation by about 40%.

It has been mentioned that the receptacle containing the water should be blackened. It is also advisable to colour the water to be distilled with some black matter. Efforts should be made to avoid deposits of solid salts on the walls of the receptacle, since these might modify the original colour.

The receptacle should also be carefully insulated. In the Las Salinas experiment the water was contained in wooden tanks set directly on the ground. This led to considerable losses of heat, particularly through the damp ground. The ideal solution would obviously be to construct the equipment in some insulating material. The development of the plastics industry gives hope of some interesting developments in this field. In any case, losses through heat conduction should not exceed 10%.

It is evident that the circulation of air inside the still itself is also responsible for certain losses. This is inevitable since a vacuum has not been created. However, such losses are fairly negligible, since they do not exceed 4%.

Finally, there are the losses due to leakage of vapour or liquid. It is difficult to produce completely tight joints without causing a considerable increase in the cost of equipment. Consequently, a certain amount of water vapour is bound to escape to the outer atmosphere. This problem of leakage is certainly one of the most difficult to solve in the case of a reasonably-priced and constantly-used still. It is, however, to be hoped that the ingenuity of constructors will shortly enable them to discover a satisfactory solution.

COMPLEX SYSTEM: It has been seen how the output of a still can be raised by increasing the temperature of the water. Research scientists have therefore naturally attempted to concentrate the sun's rays on the water by means of different optic devices of varying complexity. Notable attempts have been made in this field by F. Pasteur, in France, and Abbot, in the United States.

Output depends on the care with which the apparatus is constructed. Unfortunately, this type of equipment does not appear to provide an answer to the problem of distilling at a moderate cost.

Actually, optic reflectors only focus direct solar rays and the radiation emitted by the remainder of the sky is consequently put to no use. This results in an inevitable loss of 10%. Furthermore, the optic system must follow the sun exactly, even on days when there is a strong wind; hence the necessity for costly mechanical equipment, both difficult to produce and costly to maintain. Maximum effectiveness should therefore be obtained from this type of apparatus by utilizing the multi-purpose still which was mentioned earlier.

Use could also be made of systems for concentrating solar rays in order to generate motor power or electric current which might be employed for distilling fresh water. It would not appear practical to make common use of such equipment and it is rather doubtful that this particular combination could supply fresh water at a reasonable cost.

However, it should be mentioned that in France, Coanda has undertaken construction of a still which utilizes solar heat concentrated on the focal line of a cylindro-parabolic mirror. This apparatus is to be multi-purpose and it is planned to retrieve condensation heat for further vapourization. Experiments are at present under way. However, nothing would appear to have been published as yet and it is quite impossible to give even an approximate estimate of the per litre cost of producing fresh water by this method.

The Russians would also seem to have given attention to the problem of large-scale distillation. In 1951 and 1952 the Solar Laboratory of Tashkent was working on the final stages of a three-storey still, operating on steam supplied by a parabolic mirror with a surface area of 80 square metres. This still produces about one thousand litres of distilled water daily. It consumes approximately one kilogramme of vapour for every 2.5 litres of distilled water produced. The water obtained by this method might be economically used for watering cattle in dry areas. Its production cost is apparently lower than that of water transported by lorry or distilled locally by using standard combustibles.

The question of economic production also occurs with regard to vacuum type apparatus. In 1926, Pouget installed a flat zinc boiler on a terrace of the Faculty of Science in Algiers, at a height of 11 metres from the ground. The outside surface was blackened and the entire equipment placed inside a glass cage. Water, heated externally, was introduced into the distilling equipment where vapourization occurred. Condensation took place on a coil tube, cooled by running water. This apparatus does not appear to have given satisfactory results.

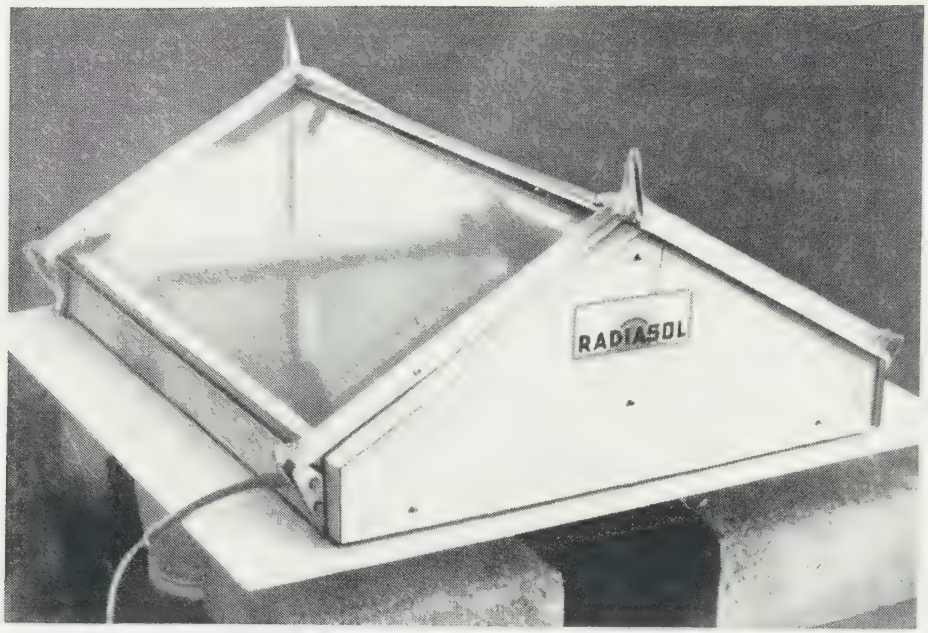


FIGURE 6: The Radiasol still, which is manufactured in sheet steel, is insulated at the base and sides with fibre glass.

Complex systems, which generally prove too expensive, merit no further consideration here, and our attention will now be devoted to single-action still.

Present-Day Achievements

Intensive research is being carried out in a number of laboratories. E. D. Howe, of the University of California, has undertaken a comparative study of different types of solar still. He has reached the following conclusions:

(i) The apparatus should be as light as possible in order to reduce the latent period of heating.

(ii) The quantity of water left in the tank at sunset should be small so as to avoid loss of heat overnight, owing to cooling of the heated water.

The panes of glass should be as long as possible in order to reduce the size of the shadow cast by their frame. Further, it may be advisable to create currents in the air and water in order to facilitate the transfer of heat from the bottom of the receptacle to the surface of the water, and of damp air to the condenser glass. This can be achieved by combining several consecutive pieces of apparatus and installing a pump after the final one. But such improvements should not be allowed to render the process economically impracticable.

A series of experiments was made in Cyprus in 1954 and 1955. The still utilized followed the same general lines. In this particular attempt effort would appear to have been concentrated on ensuring that the apparatus was absolutely tight; this, as we have seen, can have a tremendous effect on output.

It should, however, be realized that the methods utilized to obtain hermetic sealing remain problematical and that some practical, effective and cheap solution has yet to be found. Nevertheless, the apparatus evolved in Cyprus was put to some practical use, since four lemon and two orange trees grew and flourished during the winter of 1954-55, using irrigation water produced entirely by solar stills.

In North Africa and the Sahara the problem of solar distillation is particularly complex. Brackish water is to be found in places where the population is thinly distributed, motor power very expensive, means of communication underdeveloped, and transport is consequently very expensive. Equipment which is small, light, easy to handle and transport, and which resists variations in temperature, sandstorms, corrosion and termites, is thus advantageous.

Yet a further difficulty arises in this area, where the water is decidedly calcareous or magnesian. The equipment becomes furred with crystalline deposits which adhere firmly and cannot be removed simply by rinsing with brackish water. It is an easier proposition to distill sea water than the magnesian water of Toggourt. In any case, no installation of any importance would appear to have been established in North Africa. The question is nevertheless under discussion, and estimates have already proved that the use of equipment for solar distillation would be economically worth while.

Experimental stations have also been established in Australia, Israel, Egypt, India, and in most other countries where water is scarce.

The Radiasol Still

In French West Africa experiments are at present being made with equipment which the Radiasol Company has been mass-producing for some time past. This type of apparatus is generally considered the best from the economic viewpoint (see Figure 6).

The still, manufactured in sheet steel, is insulated at the base and sides with fibre glass. The tank itself is covered with a black plastic material, which can be easily removed. It serves the dual purpose of providing a black exterior and facilitating cleaning. A double tube fitted on the side is used for filling and emptying. Gutters are made of plastic material. The water is collected simultaneously from both sides. The apparatus is made sufficiently hermetic by use of rubber at all joints. Although it is difficult to render equipment completely tight, the pipework can be so fitted as to ensure equal pressure.

RESULTS: The quantity of water obtained obviously depends on the place in which the experiment is carried out, as well as on the season at which estimates are made. It is as yet premature to give an average of results obtained at Dakar with the above equpiment.

In Table 1 are the figures supplied at the Phoenix Congress by the various experimenters quoted by Maria Telkes.

TABLE 1

LOCALITY	LATITUDE (degrees)	AREA USED ($m.^2$)	QUANTITY OF WATER OBTAINED PER DAY (litres/$m.^2$)	
Cohasset	42	20	August, September	5.4
Berkeley	38	100	June	3.8
			January	0.5
Australia	38	0.5	Summer	6.6
Italy	41	5	June	4.5
			March	1.5
Algiers	33	1.6	June	5.6
			December	1.4
			Yearly average	3.7
Morocco	32	0.8	June	4.1
			December	1.5
Madison	43	1	Yearly average	2.6
			Summer	3.9

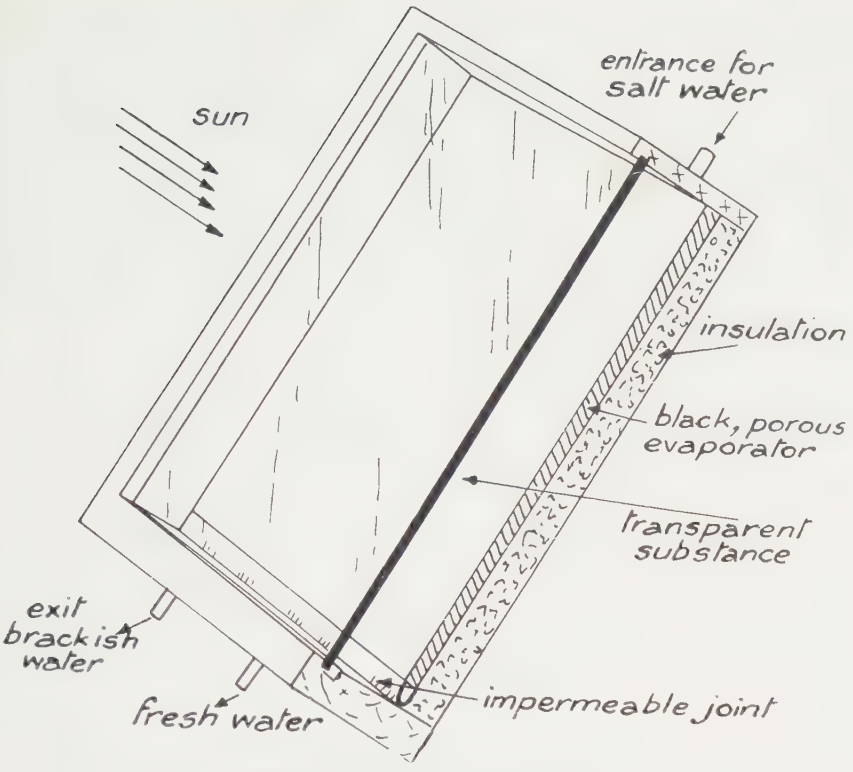


FIGURE 7: Diagram of a cloth solar still.

Production Costs

Users are mainly interested in the production cost of water obtained with any given equipment.

How are production costs to be estimated in this case? If a solar still is capable of producing a certain quantity of litres of water per day, the per litre price can be estimated by dividing the cost of equipment by the number of litres. But running costs must also be taken into consideration. These are fairly easy to calculate in the case of complex equipment operating at high output and using some natural fuel; the same cannot be said for simple stills where very little is known about maintenance costs and durability.

It is also possible to calculate the per litre price by estimating the total number of litres likely to be supplied by any given equipment. This second method is rather intuitive, and for this reason has been adopted by the present author.

Recent information reveals the following figures. Unfortunately, it was not possible to obtain details of the method of calculation:

Distiller with Concentration Device United States—

Fr. Frs. 0.35 per litre of water[1]

Distiller without Concentration Device United States—

Fr. Frs. 0.15 per litre of water[1]

Australia—

Fr. Frs. 0.30 per litre of water[1]

[1] Fr. Frs. 1,000 = £.Stg.1 (approximately)
Fr. Frs. 1,000 = U.S. $2.50 (approximately)

Information received from North Africa indicates higher prices. As for the Radiasol still utilized in Dakar, it is as yet premature to supply any definite figures. However, on the supposition that the equipment is likely to last two years, the estimated cost per litre is approximately 1 franc.

It should be noted that this estimate is for apparatus measuring one square metre, this being the most uneconomic type. It is obvious that the production cost is considerably reduced in proportion to any increase in the surface area of equipment, and there is no reason to suppose that duration of the equipment will not exceed two years.

Prospects For Single-Action Solar Stills

The possibilities of such apparatus have already been indicated. Let us now consider whether any improvements are possible. Certain experimenters colour the water with black matter in order to intensify and accelerate the heating process.

With regard to materials, the use of plastics can be expected to result in a reduction of costs, especially in the case of large-scale production. These can be used for the framework, receptacle, gutters and the insulating covering; even the glass might be replaced by transparent plastic material. This will presumably give rise to certain difficulties, since plastics do not possess the same qualities of permeability to radiation as glass. It will undoubtedly also prove more difficult to avoid formation of drops of water, with consequent reflecting action, on the transparent surface as we have seen, under ideal conditions of operation, this surface should be uniformly covered with a thin liquid film).

But none of these difficulties would appear insurmountable and solutions are, in fact, already in sight.

Improvements might also be effected with regard to the form of the apparatus. In Algeria and the United States experiments are at present being made with stills composed of a piece of black cloth spread on an inclined plane along the horizontal of an angle which varies according to latitude. It is enclosed in a glass case, exposed to the sun's rays. A slight adjustment causes the brackish water to impregnate the cloth very gradually; the water is heated and partially vapourizes. The vapour condenses on the glass and runs off into a gutter. Any brackish water which is not vapourized runs to the base of the apparatus from which it is evacuated. This still has a much higher output than that described earlier. Its action is considerably enhanced when the sun is not too far distant from the horizon. In fact, the glass forms a wide angle (78°) with the horizontal. (See Figure 7.)

In conclusion, mention should be made of an unexpected method for obtaining enormous quantities of fresh water from sea water. Plans are under way to establish a steam-generating station at Abidjan, utilizing the surface of the sea or of a lagoon heated by the sun as a source of hot water, and water taken from a depth of 400 metres at an approximate temperature of 8° C. for cooling purposes. The hot water, vapourized under vacuum, produces steam which operates a turbine before condensing. This condensed water is fresh water which will be a valuable by-product of the generating plant. The machinery, planned with total net power of 3,500 Kw., will consume 15 cu. metres of hot water per second and produce a hundred tons of fresh water per hour.

This is a dream come true for the inhabitants of certain coastal areas, where drinking water has now to be imported.

Conclusion

The foregoing considerations demonstrate how world attention is being focussed on the utilization of solar radiation for producing fresh water. Efforts to date have been scattered. If methodical research is undertaken, it is to be expected that output will increase and prices fall. It is certain that if arid regions could be supplied with fresh water, obtained from sea water processed in solar stills, world economy might undergo radical changes. Perhaps the day may come when giant factories will produce their own power by using solar energy. Who would dare to state with assurance that the dream of today will tomorrow still belong to the realms of pure fiction?

Simple Method For Felling Coconut Palms

To The Editor

Sir,—In the January 1954 issue of the *Quarterly Bulletin* you published an article entitled "The Economic Felling of Coconut Trees". This describes an excellent method where poison is available, and the reasons given are all very true. It does, however, have one serious drawback, and that is that after a tree is felled there is still the problem of removing the stump and roots. If the stump is left in the ground it can take anything from five to fifteen years or more to rot away. To dig it out is a back-breaking job which is expensive in time and labour.

We have found the following method much easier and cheaper, as it does both jobs in one operation. First of all, the fronds are cut if they are liable to do much damage in falling. A rope is then attached as high up the trunk as materials will admit and a handy billy tackle is used to give the tree a spring in the direction in which it is to be toppled.

Then, with a sharpened whale spade, or with a spade and old axe, the ground is dug away around the tree and the roots cut through. If the soil is piled up on the side in which the tree is to be dropped this helps in breaking the roots clear.

It is not necessary to dig all the root away as the leverage of the tackle on the long trunk pulls the palm over long before all the roots are severed. The falling tree then drags the root right clear of the ground, where it is a simple matter to cross-cut it through with a sharp saw.

Yours, etc.,
Ronald Powell.

Rarotonga,
Cook Islands.

Commission Holds Sixteenth Session

(Continued from page 9)

territories.

During the past year production has continued of a wide variety of filmstrips, posters, leaflets and flannelgraphs, partly for territories and partly for the campaign in village hygiene being sponsored by the Commission's health section.

The Bureau will continue to assist territories as in the past and will also advise in the setting up of libraries, literature committees, and in the establishment of book shops.

Pacific Co-operatives

In 1955 a co-operatives expert, Mr. C. G. Joannides, was appointed to the Commission's staff, with the main task of visiting territories on request, to stimulate interest in the formation and conduct of co-operative enterprizes. He is also preparing practical manuals on co-operation for islands use.

The Commission noted with satisfaction the way in which the project is being developed, and authorized its continuation.

A technical meeting on co-operatives will be held under Commission auspices in 1958.

Secretary-General's Appointment Extended

The Secretary-General of the South Pacific Commission accepted an offer of an extension of his term of office, until early in 1958.

The eighth meeting of the Commission's expert advisory body, the Research Council, will open at Commission headquarters in Nouméa towards the end of May 1957.

Dr. E. Massal, Executive Officer for Health, accepted an offer of an extension of his contract.

At the sixteenth session, the Commission's annual budget for 1957 was approved at a figure of £stg.199,000.

Blood Transfusion Service

(Continued from page 21)

The natural fear of the donors is easily overcome by an assurance that no pain or any other ill effect will result. After the donation the donor watches with great curiosity the slow drip of his blood into the sick man's vein.

The donor then receives a cup of hot tea, and also, as a reward for his or her courage and co-operation, two tins of meat, three sticks of tobacco and the Red Cross Blood Donor's Badge. No payment for the donated blood is given or permitted to be given later by the recipient.

Besides some "pyrogen" reactions, no other side-effects of incompatibility have been experienced after transfusion. (The "pyrogen" reactions could be easily accounted for by faulty technique in setting up the transfusion sets and the bottles.)

Such other undesirable transfusion side-effects as the transmission of malaria and yaws have not much significance here in practice, as nearly one hundred per cent of the population suffers from these diseases. On the other hand, the person receiving blood transfusion usually undergoes malaria treatment, and probably also receives some penicillin injections for his or her primary disease.

No cases of hepatitis have been observed. This appears to be a very rare disease amongst the people in this sub-District; in fact, not a single case has been observed in two years.

As most of the patients needing blood transfusions are suffering from gross anaemia, the problem arises of how to obtain the packed cells most suitable for these cases. This, however, in practice solves itself. When the transfusion is started the red cells usually settle in the neck of the bottle. No shaking of the bottle is permitted. After the red cells have gone the supernatant plasma is simply discarded. No doubt this technique does not give properly centrifuged red-cell volume and also leaves some plasma with the red cells, while some of the latter are wasted with the discarded plasma. However, it gives quite a satisfactory result and that is the essential thing.

For more than a year this system of providing for blood transfusions has proved its value. At present there are 3,064 persons out of 10,700 inhabitants in Kieta sub-District completely blood grouped. There are also 342 persons only AB0 grouped from different villages.

Some thought may now be given to ways of improving this system and possibly setting it in operation throughout the vast area of the South Pacific.

In each territory a special team could be organized to provide what could be known as the Blood Transfusion Service. Initially this team would have to perform two important tasks:

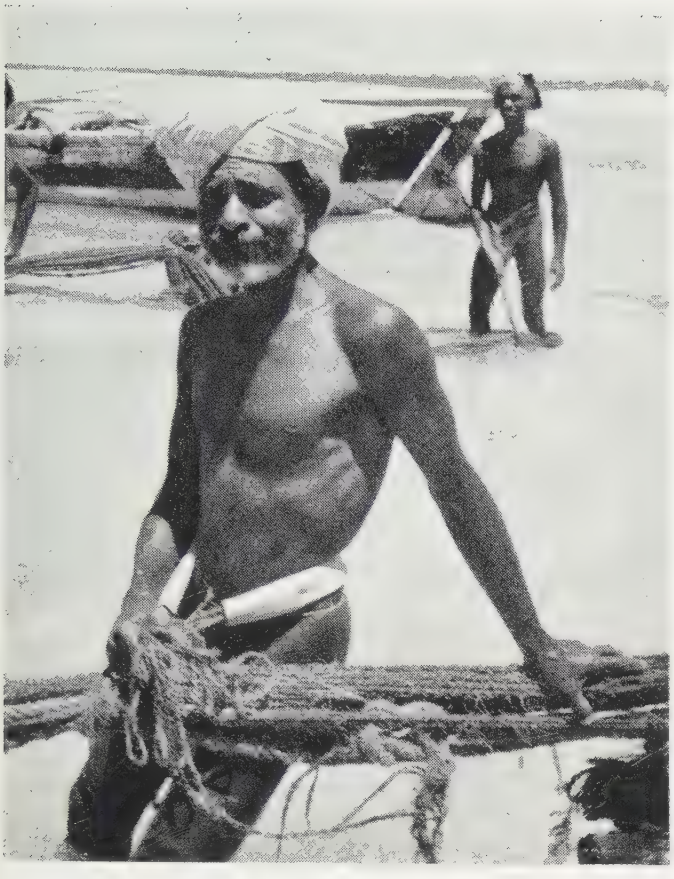
1. In its central laboratory it would set up the blood-taking and giving sets and also transfusion bottles with anti-coagulant. These should be autoclaved, packed according to climatic requirements, and distributed throughout hospitals in the territory. The smallest could be supplied with five sets each initially; the biggest with more. After the bottles and the sets have been used, they should be cleansed and immediately returned to the Blood Tranfusion Service for re-setting, re-autoclaving and re-distribution.

2. The Blood Tranfusion Service could also organize one or two field teams to travel from district to district, collect the blood in the villages and perform the grouping tests and haemoglobin estimation. Complete records of these should be left at the local hospitals for use there. This work, enormous as it may seem, needs to be done only once in a generation, being repeated only after 20-25 years. But this again is a time far in the future when, surely, more modern ways and means will have been found for this work.

Acknowledgements

My thanks are due to the Director of the Australian Red Cross Blood Transfusion Service (N.S.W. Division), Dr. J. R. Walsh, for performing the blood-grouping tests.

I would like to thank also the Director of the Department of Public Health of the Territory of Papua and New Guinea, with whose permission this article has been published.



Above: This Ceylonese is one of fifteen fishermen hauling the wing of a beach seine net. Right: Using the FAO experimental winch unit shown, three men can perform the same task with ease.

FAO's Work In World Fisheries

The Food and Agriculture Organization of the United Nations is collaborating with the South Pacific Commission in conducting the South Pacific Fisheries Training Course now being held at Commission headquarters. This article reviews FAO's work in the development of world fisheries.

IN a world in which the population is steadily increasing and in which mounting economic pressures demand higher efficiency in every kind of work, particularly in food production, the development of fisheries is of special significance, because they remain the one field of food production in which the frontiers are undefined.

Recently Dr. D. B. Finn, Director of FAO Fisheries Division, stated that when FAO was formed, "world fisheries were in the stage agriculture was in about one thousand years ago, when man hunted wild animals and depended on the bounty of nature. We reaped but didn't sow, we practised no husbandry," said Dr. Finn. "We had developed competitive fishing of stocks which had no owners." He added: "To a large extent we are still in that stage, although we are making progress towards national and international management of fisheries."

FAO, which was formed to promote an increase in the world supply of food through international understanding, agreement and action, calls for higher efficiency in food production, especially in under-developed areas. To achieve this specialists must be trained. This is as true in fishing as in other food industries. The men who catch fish must be professional fishermen, trained in modern techniques and using the most efficient equipment.

But this condition cannot be introduced universally overnight. Often it calls for training fishermen who are not only unfamiliar with modern gear and techniques but are also reluctant to adopt them. It is an important function of FAO to help transfer the "know-how" from countries where it exists to those where it is needed, a task which must be steadily pursued over many years before results can be fully realized.

There is some evidence, however, of progress. World production of fish, crustaceans and molluscs is increasing, as is shown by the figures from the latest edition of FAO's *Yearbook of Fishery Statistics* (Vol. V, Production and Fishing Craft). Production is now in excess of 27,700,000 metric tons a year (1955), which is about 6,000,000 tons more than was produced annually before the 1939-45 war. While a good deal of this increase has taken place in highly-developed countries, there is a trend towards more production in the under-developed countries where there is urgent need for more fish consumption. Fish can, indeed, make a most useful contribution towards solving the problem of supplying more protein in the diets of

the masses of under-nourished people of the world, because fish is a rich natural source of protein.

Production Could Be Doubled

Fishery biologists and other experts believe that fish production can probably be doubled if mankind will conserve, develop, husband and co-operate internationally in the management of world fisheries. Achieving this objective must entail far-reaching improvements in the fishing industries, especially of underdeveloped areas. This is in line with FAO's work of introducing mechanization of boats, improved gear and equipment, teaching fishermen better techniques, helping to organize distribution, transport, storage, processing, marketing and so on.

To do this great work which, as Dr. Finn pointed out recently, may "take a generation or more before we shall see satisfactory results", the Fisheries Division of FAO is organized into three branches covering biology, technology and economics.

The programme of the Division is concerned with such continuous activities as collecting, analysing, collating and publishing information on all aspects of fisheries, and with technical assistance projects in various countries, ranging from work lasting a few months to undertakings spread over many years.

Part of the regular activities of the Division include publishing the *FAO Fisheries Bulletin*, a quarterly of interest to fishery specialists everywhere, *World Fisheries Abstracts*, a bi-monthly review of the world's technical literature on fisheries, and the *FAO Yearbook of Fishery Statistics*, which presents world figures of fish production, fish trade, and fishing craft. In addition, the Division publishes many studies and papers, participates in international fishery meetings and generally seeks to promote international co-operation in all fields of fisheries.

Taking in the catch on log catarmarans off the west coast of India. Replacement of these primitive craft by small powered boats capable of crossing surf is an FAO objective.

An interesting part of this effort is the establishment of regional fisheries councils in which nations in a region work together on the development of their fisheries. One such council is the Indo-Pacific Fisheries Council of which Burma, Ceylon, Hong Kong, India, Indonesia, Japan, Malaya, Pakistan, Philippines, Singapore and Thailand are members. In view of the increasing importance of fisheries in this part of the world, it is possible that other countries and territories may seek to join, perhaps among them the South Pacific island territories. Such regional bodies are naturally strengthened as membership grows.

Another such body is the General Fisheries Council for the Mediterranean, while plans are in hand for forming a third Council open to South and Central American countries and those in the Caribbean Sea.

The two existing Councils (the IPFC and the GFCM) were established with the support of FAO, which finances them and provides the secretariat for both.

This is one of two engines experimentally installed by FAO in Ceylonese craft of local design and build. The experiment proved successful, and the Colombo Plan has since presented Ceylon with over 40 similar engines.

Technical Assistance For Member Governments

There are now 74 member governments of FAO. Many which administer territories where fisheries are underdeveloped have requested, and have been given technical assistance by FAO.

Speaking about such projects recently, Dr. Finn said: "The range of work we have undertaken is too extensive to mention in detail, but I can give you a few examples. For instance, we have done a lot of practical work in Pakistan, India, Ceylon and in several Latin American countries on fishing boats—re-designing, modifying, mechanizing them and so on. In Ceylon, for example, there were no mechanized small fishing boats until one of our experts went

there, but now there are a considerable number and the fishermen are eager for more. The same sort of situation has developed in Bombay where there are now several hundreds of mechanized small boats. But you can assess the size of the task ahead when I mention that there are more than 6,000 fishing boats of 3 to 10 tons along the Bombay coast apart from the thousands of small craft."

Experts Sent To 35 Countries

To date, FAO has sent fishery experts to 35 countries in Europe, Africa, Asia and America. The projects have lasted from a matter of months to several years. Since 1951 more than 60 have been completed, but many have been going on, and will continue for a long time to come. In some instances FAO has two or more fishery experts working in the same country at the same time.

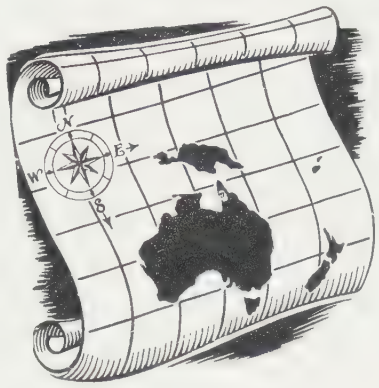
The demand for technical assistance is increasing, and during 1957 Fisheries Division will be required to find some 70 experts to carry out a variety of projects ranging from assisting governments to set up fishery services and marketing organizations, to mechanizing boats, developing storage and processing facilities, and teaching fishermen to use improved equipment and fishing techniques.

Organizing and running training centres is another very important part of FAO's work. Fisheries Division has organized a number of such centres. It is collaborating in the South Pacific Fisheries Training Course now being held at Nouméa, New Caledonia. Others have been a Fish Culture Seminar in Indonesia, a Fishery Statistics Training Centre in Thailand, an International Fish Marketing Training Centre in Hong Kong, and so on. Such courses are attended by participants from different countries. Apart from the training they receive, they benefit from discussing together their work and problems.

Officers of Fisheries Division participate in many international fishery meetings, and contribute to the papers and discussions of such gatherings.

Organization Of Meetings

Another important part of FAO's work is to organize meetings which focus attention on world problems and engender international co-operation in solving them. Fisheries Division, for example, organized the first International Fishing Boat Congress which met at Paris and Miami and was attended by naval architects, boat builders, engine and equipment manufacturers, underwriters, fishing boat owners and other interested people from all parts of the world. It was a meeting of great benefit to all who participated, especially those concerned with fishing boat design and construction. Even naval architects and boat builders from highly-developed countries in Europe and America benefited from the practical exchange of information and experience. One product of the



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meeting was a 650-page book, *Fishing Boats of the World*, based on the technical papers and discussions at the meeting.

This Congress was so successful that another is being planned by FAO. It will probably take place in 1959. Meanwhile, the first International Fishing Gear Congress is being organized by the Fisheries Division and will take place at Hamburg, Germany, 7-12 October 1957. This Congress, which will be attended by scientists, fisheries workers, manufacturers, and other people interested in fishing gear and equipment, will help to focus attention on the most important problems in this field and will provide a forum for discussing new gear and equipment, and for exchanging information and experience on a world-wide scale.

Promotion Of International Co-operation

Another example of the role of FAO in promoting international co-operation and exchange of experience and information was the meeting of the fish processing technologists held at Rotterdam last June. It did much to focus attention on the latest development in fish processing, the use of antibiotics to help in the preservation of fresh fish.

Fisheries Division is concerned with increasing production of fresh and brackish water fish as well as marine fish, and much work has been done in many countries to develop fish culture in ponds, lakes, rivers and other closed or natural waters. Perhaps an outstanding example of FAO's technical assistance in this field is to be found in Haiti, where the Organization's experts have established a fresh-water fish industry where none existed before.

Great Increase In Production Forecast

As this article shows, the work to be done in fisheries by FAO is immense and is growing. Dr. Finn recently summed up the position in these words:

"There is no doubt that fish production will go up. The better boats, gear, equipment and techniques now coming into use will ensure that, and the discovery of new resources will help to increase the yield. So, also, will new developments such as transplantation. Factors such as these, allied to the interest nations are now showing in the spoils of the sea and in the need to control their exploitation, all favour a great increase in fish production and consumption in the years ahead."

PICTURE CREDITS

Acknowledgement is made for photographs reproduced in this issue as follows: Pages 8, 9, 10, 11, M. Boixo, Nouméa; 15, 16, 17, Ronald Powell, Cook Islands; 18, 19, 20 (top), Netherlands Information Service; 21, 43 (left), Australian Official; 22, 23, Carlos Garcia-Palacios, Papeete; 31, 32, R. H. Boyan, Apia; 39, 40, supplied by H. Kristjonsson, Food and Agriculture Organization.

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Trobriand Islands girl holding yam.

Irrigated terraces of taro at Col de la Pirogue, New Caledonia.

Food Plants Of The South Sea Islands

This latest Technical Paper in the field of economic development published in printed form by the Commission is reviewed below.

By H. S. McKEE*

THE authors of *Food Plants Of The South Sea Islands* are Emile Massal, Executive Officer for Health, and Jacques Barrau, who has just completed a long survey of subsistence agriculture in nearly all the territories within the Commission area. The authors consider both the agricultural features and the nutritional value of each food plant. In many cases they give also an account of the indigenous cooking methods which produce tasty dishes from the rather unpromising starchy foods which dominate agricultural production in most of the islands.

The number of different plants used for food in one part or another of the Commission area is very large. The index to *Food Plants Of The South Sea Islands* lists over 250. The real total might be greater still, for the plant resources of many parts of the area, especially in New Guinea, are still imperfectly known.

This is true even in islands such as New Caledonia, where a long succession of botanists has diligently studied the flora for a hundred years and more. During his survey of subsistence agriculture in New Caledonia M. Barrau collected specimens of a fig growing in the forest above Ateou which provides edible fruit for the people of that village. On examination at the Museum National d'Histoire Naturelle, Paris, this species was found to be new to science, and it has been named *Ficus barraui* in honour of its finder.

The authors consider both cultivated crops and food plants growing wild in the forest. The latter include very many different sorts, but in most areas their produce is of minor importance compared with that of cultivated plants. Some of the wild food plants are found only in restricted area, but most of the major crop plants are widespread throughout the islands. Many of them have clearly been spread by human agency in comparatively recent times, and are now grown throughout the Pacific wherever suitable conditions are found.

Major crop plants are naturally considered at greater length than either minor crops or plants from which food is gathered in the forest.

Food Plants Of The South Sea Islands opens with a short introduction. The main text is divided into two sections of approximately equal length, dealing with staple food plants and supplementary food plants.

The staple food plants include sago, taros, yams, banana, breadfruit, cassava and sweet potato, each of which is certainly a major crop somewhere in the Pacific. The list also includes, more surprisingly, Polynesian arrowroot (*Tacca leontopetaloides*, also known as *Tacca pinnatifida*). This species is not at present of great importance, though it seems in the past to have formed a useful part of the diet in some islands, especially in Polynesia.

It will be noticed that all these staple food plants produce starchy edible parts. They are mostly root crops, but include also two fruits and one tree (sago) forming an edible starchy pith in its trunk. They are all unbalanced foods in the sense that they provide much energy but little of the other dietary essentials for growth and for maintenance of the human body.

The low protein content of these starchy foods is their greatest nutritional defect. None of them has much protein, but they do vary appreciably among themselves in this respect. Sago has hardly any protein—the product as eaten is almost pure starch. At the other extreme come the yams and taros with two or three per cent of protein, which appears to contain adequate amounts of

* Formerly food technologist to the South Pacific Commission.

Scraping breadfruit before cooking. Ta'u Island, Eastern Samoa.

Opening a pit where fermented paste of breadfruit is kept. Ta'u Island, Eastern Samoa.

the essential amino-acids. Bananas and breadfruit have between one and two per cent of protein. Cassava has one per cent or less, and its protein is of poor quality, being deficient in some essential amino-acids.

The importance of these differences between foods which are all rather poor in protein is greater than might appear at first sight. The basic foodstuffs are either in large quantities, and thus can contribute an appreciable part of the protein requirements of the diet even though they contain a low percentage of protein. It is for this reason that a change from foods such as taros, with a comparatively satisfactory protein content, to cassava is nutritionally undesirable, unless the diet contains enough protein from other sources.

Cassava is a high-yielding crop, tolerant of wide variations in climate and soil type, and is easy to grow. Its importance in island agriculture has been increasing for some time, and this trend seems likely to continue. The agricultural virtues of this crop make it desirable to recognize its nutritional defects, and to realise that it contributes little to the diet except starch and appreciable amounts of ascorbic acid (vitamin C).

Cassava can take a useful place in a mixed diet with good sources of protein such as fish, meat or pulses; it is dangerous as the basic food in a diet which has nothing to compensate for its lack of protein.

The section on supplementary food plants deals with a great number of different species, both cultivated and growing wild. They are divided into such groups as "nuts, seeds and pulses" and "cereals"; within each group the species are arranged systematically by botanical families. The arrangement is rather complex, but this is probably inevitable when so many plants of varied types have to be considered.

Many of these plants are of minor importance, their main value being possibly in providing variety in the diet. This section also includes, however, a few crops such as coconut and pandanus, which in some areas contribute largely to the diet. These crops are considered in appropriate detail.

In some parts of the Melanesian islands, particularly New Guinea, the Solomons and the New Hebrides, nuts from forest trees are eaten regularly. The amounts eaten are probably fairly large, but are hard to assess in a survey because the nuts are often used as snacks between meals. Nuts eaten regularly in this way must make an appreciable contribution of protein to diets in which it is otherwise likely to be deficient. Most nuts also contain large amounts of fat, another dietary component lacking from the starchy major crops. Nut trees of various species are common in the forests of many islands, and their contribution to the diet should not be overlooked. The amounts eaten may not always be large, but the nuts are concentrated foods of particular value in improving a diet based on starchy products.

Leafy vegetables, either from plants specially cultivated in the gardens or collected in the forest, also help to compensate for the deficiencies of the basic foodstuffs. The high water content of leaves makes them of little value as energy foods, but they supply appreciable amounts of good quality protein and of vitamins.

An interesting feature is the use of the leaves of some trees, including several figs and *Gnetum gnemon*. The latter is

Pandanus with edible fruit grown from a cutting in a native garden on Tarawa Atoll, Gilbert Islands.

known as tulip in pidgin, the name meaning "two leaf", in reference to the paired leaves; it has nothing to do with the flower of the same name.

The authors stress in conclusion that their work is "only a tentative survey of the main food plants used by the South Sea islanders" and is "far from complete". It is nevertheless a valuable contribution providing a framework into which the results of further studies on Pacific food plants could easily be fitted.

QUARTERLY READING LIST No. 20

A Bibliography of Publications relating to Social Development in the South Pacific.

THIS reading List represents an attempt to note every item to appear in the field of Social Development in the South Pacific during the quarter; the entries are drawn from over 100 periodicals which are regularly examined, as well as from bibliographies, publishers' notices and similar material. Publications of the South Pacific Commission have not been indexed. Items marked with an asterisk have not been seen in the Social Development section. The Executive Officer for Social Development, South Pacific Commission, Nouméa, New Caledonia, will be glad to obtain for any metropolitan or territorial government, copies of items listed.

SOUTH PACIFIC—GENERAL

(1) BERNATZIK, Hugo A.: Zuidzee. Amsterdam, 1955, 231 pp., illus., maps.*

Agriculture

(2) JOLLY, A. L.: Peasant farmers need the economist. *New Commonwealth*. June 11 1956, pp. 375-6.

Anthropology

(3) Racial problems and socio-political dangers in South Pacific. *Pacific Islands Monthly*, July 1956, pp. 13-14.

Development and Welfare

(4) SPATE, Professor, O. H. K.: Improving native living standards in the South Seas. *Walkabout*, July 1956, pp. 29-30.

Education

(5) EELIS, Walter C.: Communism in education in Asia, Africa and the Far Pacific, Washington D.C., American Council on Education, 1954; a review by Norman Harper, *Pacific Affairs*, June 1956, pp. 204-5.

Government and Administration

(6) FARNFIELD, Jean: Parliament of the South Seas. *New Commonwealth*. June 25, 1956, pp. 437-9.

Missions

(7) BROWNE, Stanley G.: Medical missions at the crossroads. *The International Review of Missions*, July 1956, pp. 278-288.

Voyages

(8) GARCIA - PALACIOS, Carlos: The Tahiti-Nui raft expedition. *Walkabout*, Sept 1956, pp. 16-18.

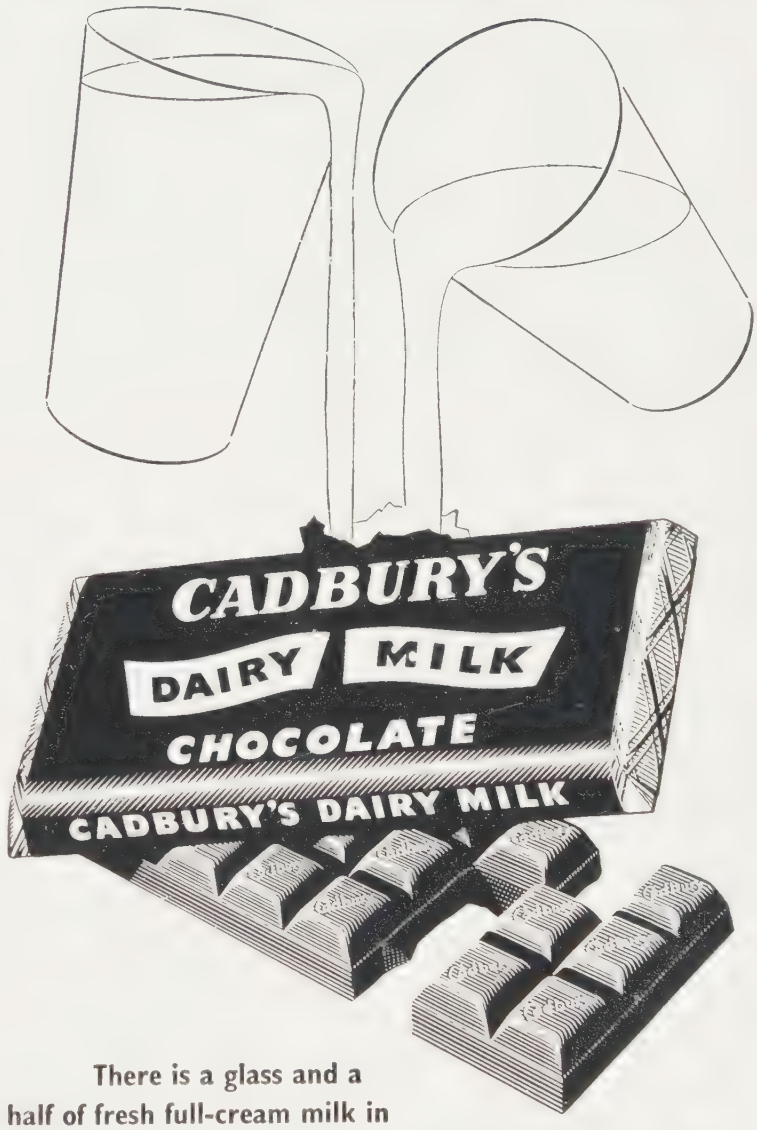
(9) SANDERSON, Ivan T.: Follow the whale. Little, Brown & Co. 1956: a review, *Pacific Historical Review*, May 1956, pp. 211-12.

POLYNESIA

Anthropology

(10) WOOLSTON, Helene W.: Luomala's "Voices on the Wind: Polynesian myths and chants": a review, *The Journal of the Polynesian Society*, vol. 65, no. 1, March 1956, pp. 87-88.

The sign of good chocolate



There is a glass and a half of fresh full-cream milk in every half-pound of Cadbury's Dairy Milk Chocolate. Over the years, this famous Cadbury identification has symbolised the world's finest chocolate.

CADBURY'S

BY MOUNTAIN AND SEA, CLAREMONT, TASMANIA

MD102/43/8

BRITISH SOLOMON ISLANDS

Development and Welfare

(11) STANLEY, Sir Robert: Advance in the Solomons. *New Commonwealth,* May 14, 1956, pp. 275-279.

FIJI

Anthropology

(12) HOCART, A. M.: The northern states of Fiji. Royal Anthrop. Instit. occasional pub. no. 11, London, 1952, pp. 304, 2 maps; a review. *Ethnos,* No. 4, 1955, p. 247.

General

(13) HANNA, D.: Housekeeping in Fiji. *Walkabout,* May 1956, pp. 18-19.

History

(14) PARNABY, Owen W.: The regulation of indentured labour to Fiji, 1864-1888. *The Journal of the Polynesian Society,* vol. 65, no. 1, March 1956, pp. 55-65.

Housing

(15) ROTH, G. K.: Housebuilding in Fiji. *Journal of the Royal Anthrop. Instit. of Gt. Britain & Ireland;* vol. 84, Jan.-Dec. 1954, pp. 91-102.

Travel

(16) HANNA, D.: Voyage to the Yasawas (Fiji Islands); *Walkabout,* August 1956, pp. 33-35.

FRENCH OCEANIA

Archaeology

(17) TEISSIER, R.: Ile Tupuae Manu on Maiao Iti. *Bulletin de la Société des Etudes Océaniennes,* no. 114, tome x (no. 1), Mars 1956, pp. 517-523.

Anthropology

(18) McCARTHY, Frederick D.: The races of man in Oceania. *The Australian Museum Magazine,* June 15, 1956, pp. 54-58.

History

(19) COTTEZ, J.: Rétrospective des Pavillens Océaniens (Gambier, Iles Australes, Archipel de Cook): *Bulletin de la Société des Etudes Océaniennes,* no. 115, tome x (no. 2), Juin 1956, 543-564.

GILBERT AND MARSHALL ISLANDS

General

(20) CROWL, Philip A., and LOVE, Edmund G.: Seizure of the Gilberts and Marshalls: a review, *Pacific Hist. Review,* May 1956, pp. 199-200.

NETHERLANDS NEW GUINEA

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(21) Bibliografie van Nieuw-Guinea. *Tydschrift "Nieuw-Guinea,"* vol. 16, no. 5, Jan 1955, pp. 133, 153, 160.

General

(22) BOELEN, K. W. J.: Dokter aan de Wisselmeren. Baarn, 1955, 221 pp., illus., maps.*

Linguistics

(23) GALIS, K. W.: Talen en dialecten van Nederlands Nieuw-Guinea. *Tydschrift "Nieuw-Guinea,"* vol. 16, no. 5, Jan. 1956, pp. 134-145.

NORFOLK ISLAND

General

(24) WATERWORTH, J. Y.: Norfolk Island —Cinderella of the Pacific. *Walkabout,* August 1956, pp. 18-20.

PAPUA AND NEW GUINEA

Anthropology

(25) BELL, Frank: Building a bark canoe at the Archer River, Thursday Island. *Walkabout,* May 1956, pp. 22-25.

(26) GROVES, Murray: Dancing in Poreporena. *Journal of the Royal Anthrop. Instit. of Gt. Britain and Ireland;* vol. 84, Jan.-Dec. 1954, pp. 75-89.

(27) MAAHS, Arnold: New Guinea chiefs give to get rich. *Natural History,* April 1956, pp. 177-223.

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(28) Bibliografie van Nieuw-Guinea. *Tydschrift "Nieuw-Guinea",* vol. 16, no. 5, Jan. 1955, pp. 133, 153, 160.

Geography

(29) EVANS, A. H.: Goroka walkabout, a journey through the central highlands of New Guinea. *Walkabout,* Sept. 1956, pp. 31-34.

Unusual Fishing Method

By Ronald Powell, Cook Islands

MANY years ago I heard of a man (Charlie Seigel) who lived on Manihiki Island for several years and taught the people how to catch some unusual fish in very deep water. The people at that time did not know of the existence of this fish, which they eventually called a Parumarau. It is like the common Marau or Ku caught in the Cook Group at night by a trolled feather. The surface fish weigh two or three to the pound. Paru in Manihiki is the equivalent of the Vena or Uruvena of the lower Cook Group (the castor oil fish, or Ruvettus). The Parumarau is possibly one of the *Berycidae* family, but I am not at all sure of this.

Parumarau are caught in daylight in depths of from two to three hundred fathoms, but it is essential to get bottom first before the fish will strike. It is a large fish, weighing up to fifty or sixty pounds, and is reported excellent eating. (There are practically no poisonous fish in the Cook Group, so that no one had any fear of eating it.)

Although this type of fishing was practised in the early part of this century, the natives dropped it for nearly forty years. It does not seem to have been revived again until last year, when several Manihiki men tried it out again, using the new type of tuna hook with an incurving point. (These have practically replaced the more conventional hook for deep water fishing.) They were very enthusiastic about the results. They found that it is necessary to haul the fish only part way up, when they become inflated by air due to the rapid decrease in pressure.

I hope I will soon be able to try out these methods, and perhaps improve on the gear used; it is a back-breaking job hauling three-hundred fathoms of heavy line from a canoe. If it is possible to design a simple form of winch to wind the line up on a drum, this may well be a form of fishing that will stand investigation in other islands.

Project In Community Education

(Continued from page 24)

There are many other similar questions on how the people of the community spend their money. The children surprised me with so many answers.

There are families who said that they did not know how much money they spend a day, a week, a month or a year. Almost all families said that they hadn't figured the money they spent, and that they didn't know how to do it. Some families said that they did not care to know such things. But to me this was a big mistake.

I knew that the people were spending lots of money for things that were unnecessary. They did not even know why they spent their money. So I thought it was my job to do some explaining.

We had a good time studying the answers to the questions the children brought from the people, especially in our arithmetic period. We even made some teaching and learning materials for our own school. After some days of studying all this information in class, I arranged it into some kind of order. I had the children take the results we obtained from our study back to the people. We worked out roughly the amount of money each family spent a day, a week, a month and a year. By adding all families' expenditure we found the amount spent by the whole community. Then we found the average amount spent by each family. We may not have given them the exact amount of money they spent, but I am sure it was nearly correct.

After the experiment had taken place, and the people had learned that they were spending lots of money on unnecessary things, I heard that a more careful spending of money by some families had begun. I even heard from some people that they appreciated very much our explaining things they didn't know anything about. They were also very glad seeing their children explaining things that no one had known about before.

Development and Welfare

(30) WEST, F. J.: Colonial development in central New Guinea. *Pacific Affairs,* June 1056, pp. 161-173.

TRUST TERRITORY OF THE PACIFIC ISLANDS

Anthropology

(31) LESSA, William A.: Myth and blackmail in the Western Carolines. *The Journal of the Polynesian Society,* vol. 65, no. 1, March 1956, pp. 67-74.

Co-operative Trends In Western Samoa

(Continued from page 32)

interesting—and perhaps unique—development in Western Samoa is the formation of a society to import ice cream and frozen foods for members who are individual shopkeepers.

The Society operates fully in accordance with co-operative principles, and has been instrumental in spreading more widely, knowledge of the principles and value of co-operation. This is particularly interesting in the light of the information already given of the conversion of individual enterprizes into co-operatives.

In the foregoing an indication has been given of various patterns and practices relative to retailing and marketing. In addition, it is believed that other aspects of the co-operative movement will not be overlooked.

The two saving and lending societies will, it is hoped, serve as models for others, while the reported introduction of a new copra-buying procedure by the Copra Board as from 1st January 1957 may encourage copra processing by societies.

Other developments will surely follow.

Coffee Production In New Caledonia

(Continued from page 30)

ries after harvesting (dry method);

(i) rapid washing of the coffee (in-parchment or berry) soiled after drying;

(j) storage of coffee only when absolutely dry;

(k) processing to be based on purchasing standards prevailing on the export market, taking these into account at the local level.

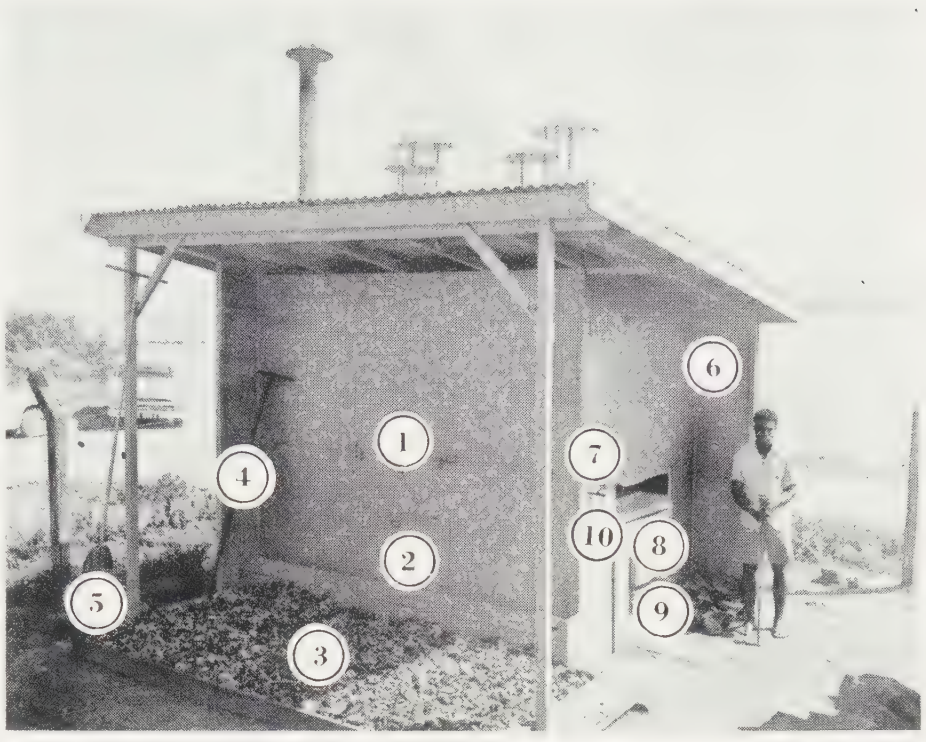
* * *

Improvement of coffee-growing, as has been revealed, sets a number of technical problems which require study by specialists capable of applying the recognized tests and providing from their results a solution which takes into account, as far as possible, the actual agricultural situation. These technical specialists should be employed by some organization for applied research whose immediate impact would, in my opinion, fulfil quite adequately the present need for restoring New Caledonia's coffee plantations.

Furthermore, in the general field, it must be admitted that the agricultural progress of overseas territories is always dependent on the establishment of some research organization which, while assisting in the practical application of science to agriculture, also contributes directly to the improvement of plant material.

Technologically speaking, coffee presents fewer difficulties than are encountered by growers. Such problems as do exist might be adequately solved by adopting the rational processing methods developed and utilized by the big coffee-producing countries. They could possibly be applied under the guidance of the Department for agricultural extension work, without any preliminary agronomic research. Action undertaken at the beginning of harvesting should show results by the end of the season. Unfortunately, however, such a spectacular undertaking would not be practicable in New Caledonia, in that local trade would be absolutely obliged to respect the purchasing grades established by the grading Department, not only in the case of coffee intended for export, but also that for home consumption.

Coffee production in New Caledonia forms the principal primary industry, and thus is certain to repay in good measure any improvements which may be undertaken. Admittedly, there is a demographic factor in the territory likely to prove unfavourable to the achievement of these objectives, but co-operation on the part of the planters should help them to overcome such difficulties, as they should soon be able to achieve their general intention of improving production of the plant best suited to their country.



The "Perfect 50" hot-air copra drier. 1—copra tray door; 2—cleaning and inspection door; 3—previous day's copra; 4—light wooden scraper; 5—flat iron turning shovel; 6—lever for adjusting upper ventilators; 7—dial thermometer; 8—firebox doors; 9—ash and ventilator doors; 10—crank handle for running out copra tray.

New Hot-Air Copra Drier For Smallholders

A NEW hot-air copra drier, designed and manufactured in Fiji, has been placed on sale by W. R. Carpenter & Co. (Fiji) Ltd. The drier is named the "Perfect 50" because it will produce 50 tons of copra in a year of 50 weeks, operating 5 days a week.

The makers claim that the "Perfect 50" produces, under any weather conditions, clean, well-dried copra with low fatty acid content, which will be slow to deteriorate. Larger producers can use two or more units economically; one attendant is capable of attending up to four, if properly located.

Capacity of the drier is 840 pounds of green nuts (average of 1,100 coconuts). The drying of each batch of copra is completed in under 24 hours, using as fuel less than half the husks removed from the coconuts. Water tanks inside the drier help to keep the temperature even throughout the drying process. Water consumption approximates 14 gallons in 24 hours.

Deputy Secretary-General Resigns Post

THE resignation of Mr. John Ryan from the post of deputy Secretary-General to the South Pacific Commission was announced at the closing meeting of the Commission's sixteenth session, held at headquarters in Nouméa from October 18 to November 8.

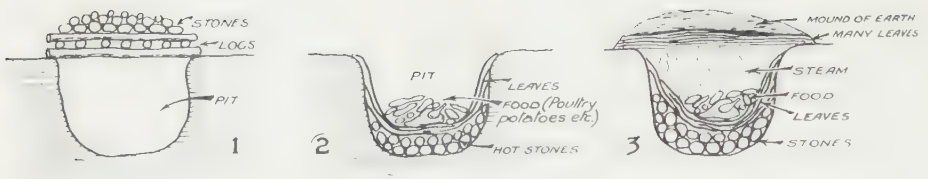
Mr. Ryan, who is 40, is an Australian and a law graduate of Sydney University. He joined the Commission in 1948, the year following its formation, and was appointed deputy Secretary-General in May 1951.

The Commission received Mr. Ryan's resignation with regret, and expressed the highest appreciation for his work during his long service in the Secretariat.

It was felt that the successful establishment of the Commission was due in no small measure to Mr. Ryan's devotion to its aims and principles at all times, particularly during the difficult formative stages of the organization.

The Secretary-General of the Commission, Dr. Ralph Clairon Bedell, pointed out that Mr. Ryan on several occasions had acted as Secretary-General.

"Mr. Ryan," he said, "has served the Commission since its early days and is known throughout the Pacific for his excellent work in furthering the Commission's programme."



Islands Pressure Cooker

Contributed by Mrs. R. G. Tews, Goroka

People in modern countries thought they had discovered something new when some years ago came the advent of the pressure cooker. However, the process of cooking under steam pressure is not new to the people living in the highlands of New Guinea.

Round pits are dug in the ground. The size of the feast determines their number and depth. Logs are then laid in criss-cross fashion on top, and stones are piled on the logs. A three-layer pile of logs is usually sufficient.

When the logs burn the stones become very hot, and as the logs burn through the hot stones fall to the floor of the pit. Immediately the latter is lined with leaves and then into it go the pig, fowls, sweet potato and spinach, or whatever needs cooking. The food is covered with leaves and a mound of earth, and allowed to steam for several hours.

Europeans as well as natives praise the food cooked in these pressure pits; it is both nutritious and delicious.

Trochus Fishing

By RENE GAIL*

*M. Gail was a popular Instructor in the Fisheries Training Course. This translation of his notes for his Lecture on Trochus** gives valuable suggestions on economic exploitation of this shell.*

ALTHOUGH it is commercially less important than the pearlshell oyster, the trochus shell, used as raw material for mother-of-pearl buttons, is nevertheless a very valuable export item and plays a noticeable part in the economic life of several territories in the South Pacific (Solomon Islands, Fiji, New Caledonia, etc.).

From a social point of view trochus fishing, mainly a native activity, supplies the local population with a fair income and also tends to check migration to the town areas, thus keeping alive amongst tribes and whole populations the trades and traditions of the sea which have been forgotten in too many regions.

The twofold value of this shell—in the economic and social field—is particularly obvious in New Caledonia, where 2,000 fishermen (mainly natives) make a living from its industry (half a century old by now). Last year, the value of trochus exports reached nearly 38 million C.F.P.

On account of its importance, trochus is the main sea product in the territory; since the dramatic fall of copra prices (another traditional production), it occupies the third place among territorial export items, after ore and coffee.

Unfortunately, in New Caledonia as well as in other localities in the distribution area of trochus, the development of fisheries shows that the species is directly threatened, without any possible doubt, with over-fishing, that is fishing beyond its possibilities of reproduction.

The increasing scarcity of trochus, due to intensive exploitation, is stressed by the recent evolution of the world market for mother of pearl, with conspicuously increasing prices; according to world experts this is a direct result of "increasing scarcity of the raw material".

Neither research nor regulations, whether in New Caledonia or elsewhere, has been able to check threatening scarcity.

Research Plan

In order to solve the difficult problem of ensuring both economic exploitation and perennity of the species, the French Institute of Oceania has undertaken further research on trochus biology and fishing as early as September 1955. This work, planned on a wide scale, will cover a reef area of more than 1000 Km. and last for several years.

New methods of research will be used, among which are: observation in situ by skin and aqualung divers; experimenting on the scale and within the limits of the natural environment; working out of a satisfactory method for marking the shells with a view to studying growth and migration.

These aspects of the work should normally result in a better and more accurate knowledge of the main biological characters without which no sound regulations can be recommended.

Taking into account environmental conditions, it becomes possible, at this stage of the research, to look forward to a synthesis of all acquired knowledge of the biology of the species and to a generalization of protective measures,

(Continued overleaf)

* Marine Biologist, the French Institute of Oceania, Noumea.

** Trochus Niloticus Linne.

M. RENE GAIL

IT was with great sorrow that the staff of the South Pacific Commission received the news of the tragic accident of Monsieur René Gail, who, when diving with an aqua lung near Nouméa, did not come up to the surface again.

M. Gail was a very valuable lecturer at the South Pacific Fisheries Training Course, giving lectures on protection of marine resources and on trochus fishery, subjects on which he was so highly qualified. M. Gail was not only a highly esteemed collaborator of the Training Centre for his outstanding knowledge, but also for his fine character.

His research on trochus has been carried out in New Caledonia as a project of the Institut Français d'Océanie.

M. Gail has done much work using the aqua lung with a view to gathering knowledge about the possibility of the use of this apparatus in trochus fishing, and its influence on the already existing situation of over-fishing. He fell victim to one of the many dangers attached to aqua lung diving, and thus the world has lost an expert in trochus whom it will be difficult to replace.

Rene Gail preparing for a dive in connection with his research on trochus.

with the help of foreign research workers.

First Results Obtained

Research carried out at the lower level of the vertical distribution of this pearl shell molluse, on its growth and reproduction has shown that: (1) contrary to popular belief, no trochus is to be found at a great depth; (2) the recent evolution of fishing, showing a tendency to intensify exploitation of the bottom of the outer fringe of the reef, means indeed plundering the last natural reserve of the reproductive individuals of the species; this reserve lies within reach of the skin divers; (3) it is both urgent and necessary to substitute for this last natural reserve, which is rapidly dwindling away, another source of reproductive individuals whose perennity will be guaranteed by raising the minimum size under which trochus fishing becomes illegal; (4) should these steps not be taken without further delay in view of the protection of the species, there might be a risk of our having to cross the industry of trochus fishing off the list of territorial resources.

Training Course Mid Term Report

(Continued from page 13)

building and repairing, and installing marine engines. Now all have at least an elementary knowledge of both subjects.

The students have shown a keen interest in fish cultivation. Last year the Commission established two experimental fish ponds at the Port Laguerre Farm School, near Nouméa. They were stocked with fingerlings flown from Manila of three species of edible fish, *Tilapia mossambica, Osphronemus gourami,* and *Trichogaster pectoralis.*

So far the trainees have paid several visits to the ponds. Under supervision they have drained one pond by removing the sluice, netting the fish in the outflow and holding them in containers of fresh water for transplanting later to natural ponds on nearby farms.

Practical demonstrations have been given in fish preservation. The students now know how to salt and dry fish. Shortly they will also be shown how to smoke them. After several more practical lessons they will be able to preserve fish themselves, and to instruct their own people in the best ways of doing so.

Lectures have already been given on the biology and conservation of pearl shell and trochus. There will be others, mainly on ways of transplanting both.

Students have been given a simple grounding in oceanography and the theory of navigation. Practical navigation lessons will follow during short cruises on *Orsom III,* the research vessel that the French Institute of Oceania is generously making available for training purposes.

Under problems of management, trainees have been given a general introduction to co-operation, and to ways of organizing and managing a fishermen's co-operative society. Aspects treated so far are thrift and credit, as well as the elements of marketing, including the purchase of co-operatively-owned boats and the associated financial problems. Simple lessons in bookkeeping have also been given, so far up to but excluding the closing of accounts.

As a practical demonstration of co-operation a thrift society has been started by the trainees. To date their savings total 17,280 Pacific francs (£A.121 approximately). The lecturer plans that when the Course finishes, each trainee will be sufficiently trained to act as secretary of a simple co-operative society.

In the six weeks left of the Course students will have, in addition to regular lectures, practical instruction at sea in handlining, seining, trolling, and setting of gill nets, as well as in navigation.

The Course will close on February 22nd. When it was first proposed there were some who thought that language problems and widely varying standards of education among the trainees would prove obstacles too difficult to overcome. Happily this has certainly not been so, and we expect that when the Course is over the students will take home, to pass on to their own people, a most valuable knowledge of modern ways of catching, keeping and marketing fish.

Film Of Third South Pacific Conference

A film has been produced by the New Zealand National Film Unit of the Third South Pacific Conference, which was held in Nasinu, Fiji, in April-May last year. Although the film is of only ten minutes' duration, it gives an interesting and satisfactory coverage of all aspects of the Conference and its background.

16mm. copies of the film are available under the Commission's usual conditions of loan to non-profitmaking organizations in the South Pacific, and under certain conditions of usage to commercial organizations also. Copies are available for sale at approx. £A6/15/-.

To assist organizations which may wish to borrow the film, but which do not have projection equipment capable of reproducing a sound track, a roneoed script of the film has been produced and is available on request.

Enquiries from borrowers and requests for further details should be addressed to the South Pacific Commission, Box 5254, G.P.O., Sydney.

Plywood Industry In Papua And New Guinea

THE Australian Minister for Territories, Mr. Paul Hasluck, referred recently to the development of the plywood industry at Bulolo, New Guinea.

He recalled that following investigations by experts, a joint enterprise by the Commonwealth Government and Bulolo Gold Dredging Limited, known as Commonwealth-New Guinea Timbers Limited, was set up in 1952 to carry out the harvesting of the Bulolo Valley pine stand. The joint company, in which the Commonwealth holds a controlling interest, built a £1,300,000 plywood mill at Bulolo, which commenced operations in January 1954.

Production has averaged nearly 30,000,000 square feet of plywood on a 3/16" basis per year. Approximately 200 Europeans and 400 indigenous people are employed in the enterprise.

The company was operating profitably soon after commencing production, and has continued to do so. Its initial products were highly moisture-resistant plywood and some veneers, to which was added later, waterproof plywood. Both these types of plywood are different from the bulk of Australian production and have opened up new uses for plywood.

U.S.A., Australia, the Pacific Islands and the Territory of Papua and New Guinea are the principal markets for the plywood. The export value of this product in 1955/56 was £749,179. Exports of veneers were valued at £9,440.

Mr. Hasluck concluded by saying that this enterprise was contributing materially to the advancement of the indigenous people and the general development of the Territory.

Santa Gertrudis Crossbreeds Doing Well In Fiji

TWELVE calves sired by the four Santa Gertrudis bulls imported from Australia by the Fiji Department of Agriculture in 1955 have been born so far. Six of the calves are at the Sigatoka Agricultural Station and the other six at the Colonial Sugar Refining Company's Yaqara estate.

At Sigatoka, one Santa Gertrudis bull was mated with 27 Red Poll heifers and another with a number of Zebu cross-females. The two bulls at Yaqara were mated with 25 Herefords. Observations on the different cross-breeds have begun. So far the cross-bred calves are showing up well, and compare more than favourably with pure-bred calves of the respective breeds.

PACIFIC READING

Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to Box 5254, G.P.O., Sydney, Australia.

Notes and News

Island Libraries and the Book List. The Bureau receives many enquiries about books suitable for different purposes. Books for school pupils, reference books for the teacher, books for school libraries, village libraries, and libraries for special groups such as local councils, girl guides, women's committees, etc., are all the subject of enquiry from time to time.

The Book List published in each issue of the *Quarterly Bulletin* may at times appear a somewhat miscellaneous collection, but in making our selection we try to keep all these very varied needs in mind. Subjects which will appeal to and be understood by the island reader; an attractive production; a reasonably simple treatment (to take account of those whose contacts with the outside world are not yet very wide); good illustrations and a reasonable price; these are the sort of things we look for in choosing books for review.

We hope our efforts are found useful; we know only too well we cannot always succeed, and we should at all times welcome comment and suggestions from the islands. Above all we should like to receive from the islands, reviews of books which have been found particularly useful or to have a strong appeal.

New Visual Aids Handbook. A new handbook entitled *How to Use the Kerosene Projector,* recently published by the South Pacific Commission, should be of considerable interest to all users of this type of filmstrip projector. Based on a booklet specially prepared by UNESCO for Thailand, this manual describes in detail the correct method of setting up and using the projector; the threading of filmstrips for either double or single-frame operation; and usage of the unit for slide projection. The text is well illustrated with numerous photographs and line drawings.

Copies are available, price stg.2s.6d. each, from the South Pacific Commission, Box 5254, G.P.O., Sydney, N.S.W.

Recent Bureau Books. The accompanying illustration shows the covers of some recent publications of the Literature Bureau produced in co-operation with various territories and publishers.

Rice and *Plays for Young Pupils* were reviewed in the July 1956 issue of this periodical. Reviews of *A First Hygiene Book* and *Heroes from Fiji* appear in the Book List of this issue.

Stocks of *A First Hygiene Book* were completely exhausted within a few weeks of publication, and a reprint is now being undertaken. This book is interesting not only in itself but also in its method of production (described in the October 1956 issue of the *Quarterly Bulletin*). It is a venture in new publishing techniques designed especially for small editions. One advantage it offers is the ease with which —because of its spiral binding—it may be interleaved with vernacular translations, thus forming a primer as well as a textbook on hygiene. Another advantage is the simplicity with which amendments may be made to any reprinted editions which are produced, it being a simple matter to substitute amended pages where necessary.

Pelajaran Hiri (a Malay version of *The Hiri* already produced through the Bureau in English) has been published for Netherlands New Guinea by Messrs. Longmans, Green & Co. The illustrations and format are exactly the same as for the original book. *Belanga Sihir* is a Malay version of *The Magic Pot,* which is being produced by Messrs. J. B. Wolters in association with the Literature Bureau, and is also for Netherlands New Guinea. In this case, too, the illustrations and format are the same as for the original edition in English, which was produced last year. These are the first two books which the Bureau has assisted in producing for Netherlands New Guinea. However, they represent only a very small fraction of the literature effort of that territory in recent months; we regularly receive copies of new publications from there. Among those recently to hand were a recipe book and a social studies book. (The latter is reviewed in the Book List of this issue.)

Filmstrips on Coconut Cultivation. A further three film strips have now been prepared to accompany the book

Wealth from the Coconut. The first three strips, which were produced last year, were entitled *Selection of Mother Palms, Selection of Seednuts,* and *Selection of Seedlings*; the final three strips in this series, which have now been produced, are entitled *The Coconut Nursery, Preparation of Seedling Holes,* and *Transplantation of Seedlings.* All of these strips are in colour, and are accompanied by teaching notes. An appraisal of them appears in the Visual Aids section of this issue of the *Quarterly Bulletin.* Copies of these film strips are available from the South Pacific Commission (Visual Aids), Box 5254, G.P.O., Sydney, N.S.W., at the prices quoted.

BOOK LIST No. 16

Items reviewed have been chosen for their general interest or for their relevance to educational and development problems in the South Pacific area. Wherever possible the price stated is the published price in the country of origin.

GENERAL READING

HEROES FROM FIJI. R. S. Adam. London: Macmillan & Co.: stg.2s. 1956. pp. 47. Illust. (*Pacific Heritage Series*—South Pacific Commission Literature Bureau Publication.)

This well-written book has been attractively produced with a two-colour cover; it is the first title in the new Pacific Heritage series which is intended for biographical material with a Pacific background. The author, Mr. R. S. Adam, Director of the Educational Research Institute in Fiji, has written eleven exciting and authentic accounts of acts of courage and loyalty performed in peace and war in recent years by Fijians, and Indians and Europeans from Fiji. Apart from the dialogue, which has been reconstructed, these stories are true records of gallantry, and show without exception "how ordinary men and women of Fiji followed the path of glory even when it led to danger or death."

The names of the heroes of the stories selected will undoubtedly be well known to most people in Fiji. Among them are: Sefanaia Sukanaivalu, awarded the Victoria Cross for bravery against the Japanese at Bougainville; Tevita Seru, the medical orderly who won the B.E.M. while fighting Communists in Malaya; Sergeant Puran Jorawar, hero of the aircraft crash at Labasa aerodrome; Marika Lewanavanua, a Fijian teacher who rescued an old woman from a tidal wave at Nakasaleka Village; Rasal Buksh, awarded a medal by H.M. the Queen for his courage during the earthquake at Nausori; and Rev. Mother Agnes, the brave missionary sister of the Makogai Leprosy Hospital.

The text has been printed in clear type on good-quality paper, and the book's attractiveness has been increased by the inclusion of ten excellent half-tone photographic illustrations. The Bureau is anxious to produce similar volumes in this series for other Pacific territories, and would welcome suggestions and manuscripts.

MODERN ACTION AND ADVENTURE. G. F. Lamb. London: Geo. Harrap & Sons; stg.4s.6d. 1954. pp. 208. (*Modern English Series.*)

This book has been written primarily for English school children. It is a selection of true and remarkable adventure stories which have taken place during the past ten years. In eleven chapters the author tells such stories as: the Kon-Tiki Expedition, tiger hunting in Kumaon with Col. Jim Corbett, the epic dash down the Yangtse by H.M.S. Amethyst, the first Russian flight over the North Pole, the kidnapping of a German general in Crete, the "Wooden Horse" escape from the German P.O.W. camp Stalagluft III. The heroes of these exploits include Norwegian, Americans, Cretes and Russians, as well as members of the British Commonwealth.

Although chiefly intended as a secondary school reader, this book will probably have considerable appeal to many adults.

THE VOYAGE OF KA MANU LELE. Margaret Titcomb. Honolulu: Pacific Publishing Co.; $1. 1956. pp. 30. Illust.

The subject of the ancient migrations of the Polynesians is one which has attracted research workers throughout the world and produced a great volume of writing, and indeed heroic experimentation, even at the risk of life itself. For those concerned with encouraging the production of reading material for islanders, it is almost the first field that springs to mind. Yet the course of the would-be editor is beset with perils almost as numerous, though not as dangerous, as those which faced the migrating Polynesians themselves; how to present an attractive story in simple terms, yet to distinguish between fact, theory, and myth, without reducing the story to an academic treatise.

Margaret Titcomb, in presenting a fragment of that great saga, disposes very neatly of the problem. As she says in her foreword: "In this brief tale of old Hawaii, we attempt to depict the joys, the hopes, the fears, and the anxieties of a company of migrating Polynesians many centuries before white men had even heard of the islands of the great sea. Although the characters and events are fictitious, people much like those you are about to meet did live and their experiences were probably very similar to the events in our story." The result is an attractively told tale that should find a place in libraries and top classes of schools throughout the Pacific. The reader will not only be absorbed by the development of the story itself, but will also gain a vivid picture of those days.

The English used includes a range of vocabulary and idiom which may be rather wide for many island readers. However, the author's work as a librarian at the Bernice T. Bishop Museum in Honolulu, ensures the authenticity of detail, and over and over again one comes across sentences simple enough in themselves, but which must be the outcome of a wealth of scholarship. Translation into island languages should be invaluable.

TREASURE ISLAND. R. L. Stevenson. London: Macmillan & Co.; stg.2s.2d. 1956. pp. 151.

An abridged and simplified version of Robert Louis Stevenson's famous classic *Treasure Island,* which retains all the excitement and action of the original book. Written in simple English, within a vocabulary range of 2,000 words, the story introduces the island reader to the adventures of Jim Hawkins, Dr. Livesey, Captain Smollet, Long John Silver, and other equally well-known characters in their search for hidden pirate treasure. The text is illustrated with 14 clear black-and-white line drawings, including a map of the treasure island.

Intended as a supplementary reader for overseas schools, this book should be useful for either school or adult reading. Although simplified as regards vocabulary, the sentence struc-

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A Lead Pencil—Paper and Books—Money—A School Rubber—Silk—Leather. **Probably 3s.**

THINGS WE USE: FOOD

A Packet of Tea—A Pound of Sugar—A Loaf of Bread—A Sack of Rice—Coffee—Chocolate. **Probably 3s.**

(These are all London published prices)

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ture is often idiomatic, and the book is suitable for secondary rather than primary level reading.

GEOGRAPHY

A FOOD AND PEOPLE GEOGRAPHY. A. Williams-Ellis. London: University of London Press; stg.2s.9d. 1951. pp. 63. Illust.

In a world where one half of the people is always hungry, and the population is increasing by some 25 millions each year, there is an urgent need to revise methods of food production. This little book, sponsored by UNESCO, briefly outlines the reasons for this shortage of food and tells how various international organizations are co-operating to increase and arrange a more equitable distribution of the world's food supply. This is being done by a better control of insect pests and diseases of animals and crops, more selective breeding of animals, controlling soil erosion, and educating the people to better and more effective methods of farming.

The text is simple, being intended for English-speaking children of about 12 years and upwards, and is well illustrated with a large number of relevant photographs. At the end of each chapter but one, there is an appendix providing extra work under the headings of "How We Know", "Things We Don't Know", and "Things To Do".

HOW TO LOOK AT GEOGRAPHICAL PICTURES. Series I and II. W. J. H. Watkins and H. S. L. Watkins. London: Macmillan & Co.; A.5s. 1952 and 1953. pp. 32 each. Illust.

The authors rightly point out that whilst good pictures are invaluable in the teaching of geography, much of the available material is wasted as all it gets is a hasty and uncritical glance. These two books have been produced to overcome this problem, by providing a series of useful photographs specially selected to give some training in the reading and analysing of pictures. Both books follow a similar pattern and contain a wide range of pictures depicting various industrial processes, human activities, and land utilization. Useful suggestions on the analysing and reading of these pictures are given on the inside cover of each book, and, in addition, some eight to ten questions have been set on each picture. Typical answers to these questions are given at the end of the book, making the books suitable for either class or individual tuition.

Although the illustrations are mainly of areas in the British Isles and Europe, teachers of geography in island secondary schools should still find them an important and useful contribution in teaching the pupils to get the most out of a picture. In fact, the ideas presented in these books could well be the basis for an enterprising teacher to produce a similar book suitable for island conditions.

We have only two small criticisms to make of these books and these are in connexion with their production: the lines are somewhat too long for the inexperienced reader, and some sacrifice in appearance has been made by overcrowding the preliminary pages to keep the books within 32 pages.

OMHOOG EN VOORUIT. L. de Groot, I. S. Kijne and C. J. de Witte. Groningen: J. B. Wolters. Dutch Guilders F3.50 (stg.8s.9d.). 1956. pp. 142. Illust.

Produced in attractive style and including a large number of well-selected photographs, this book in the Dutch language is intended for primary school pupils in Dutch New Guinea. Paulus Obinaroe, a Papuan, appointed to the Government Advisory Bureau, travels from Biak to Hollandia by ship and tells in a simple and attractive way about the various places he passes, and takes the opportunity to mention geographical data about them. After arrival in Hollandia he settles down to his new job. After a while his superior sends him on a plane trip around Dutch New Guinea, which gives him an even better opportunity to describe the scenery from the air. Upon return to Hollandia, Paulus is invited by the Training School for Local Government Employees to report about

his trip. Pupils of this school come from all over Dutch New Guinea. After Paulus has given his description of a district he passed the Principal suggests that a couple of pupils, actually coming from that area, should give more details about the social structure of that district.

Although specially written to help the peoples of Dutch New Guinea to look across the borders of their tribal areas and to appreciate the country as a whole, the book would be useful for anybody who is interested in the progress which is being made at present in Dutch New Guinea and who wants to become acquainted with the geographical details of this country.

SOCIAL STUDIES

LET'S FIND OUT. Book II. G. Plummer and D. E. White. London: Longmans, Green; stg.5s. 1955. pp. 223. Illust. (*Pupils Picture Book,* stg.11d.)

Part I of this series was reviewed in the book list of *Pacific Reading* No. 6, March, 1954. Like the first volume, this book consists of a series of lessons based on familiar objects, and is intended as an aid for the overseas primary school teacher in helping children of about ten years of age to learn more about the people and things they see around them. The 54 lessons cover a wide range of topics, under five main section headings—*People We Meet; What We See in the Sky; How We Travel; What the Earth Gives Us;* and *What We Read.* Each lesson is well illustrated with clear line drawings, intended for redrawing on the blackboard by the teacher, or, if preferred, a special pupil's book containing only the pictures of the teacher's edition is available. Many of the objects dealt with in the lessons will already be familiar to islanders, but some may prove strange to them.

AGRICULTURE

A GARDENING NOTEBOOK FOR THE TROPICS. A. V. and V. L. Gibberd. London: Longmans, Green; stg.7s.6d. pp. 184. Illust.

Beginners and amateur gardeners will find much of interest in this simple but practical introduction to gardening in tropical areas. Based on the authors' many years of gardening experience, its pages include advice on such topics as: plant growth, manuring, making and using compost; plant propagation and cultivation; growing vegetables and tropical fruits; ornamental gardening; lawns; rock gardens; roses, and their identification; and control of diseases and pests in the garden. A short appendix lists the various gardening tools required. Although written primarily for Nigerian conditions, much of the information given is also suitable for other tropical areas, especially those with climatic conditions similar to Nigeria. To assist the reader in this respect, a chapter entitled "Climate and Seasons" deals very fully with different types of climate and indicates changes necessary for successful gardening operations in other areas.

HEALTH

A FIRST HYGIENE BOOK. Sheila Jamieson. Sydney: Processed by South Pacific Commission Literature Bureau; A.3s. 1956. pp.31. Illust.

This book should be welcomed by many people in the islands who have, for a long time required an extremely simple and well-illustrated hygiene book. Specially prepared for use in the Pacific area, this book is designed to acquaint primary school pupils with those principles of hygiene essential for happy and healthy living. The text is simply and clearly written, with the information being conveniently grouped under six main headings—Keeping Clean; Clothing; Food; Sleep; Sickness; and the House and Village; each section is well illustrated by Joy Fox with attractively drawn black-and-white illustrations. The book is printed in a large,

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MACHINES by *F. E. Joselin* 1/6

This book examines the primitive water-lifting machine, the balance, measurement of effort, the development of the wheel, the bicycle, friction and its avoidance, gears and screws, and the working of a sewing machine.

INSECTS AND DISEASE by *E. B. Edney* 1/6

This book introduces the study of the scientific method by showing how it was applied to solving the problems of the origin and treatment of tropical diseases. It discusses insects in general, and then examines some of them in more detail. The diseases caused by these insects, and simple preventive measures against the diseases, are described.

WEATHER by *R. C. Ellis* 1/6

This book makes frequent use of simple experiments to develop the pupil's powers of observation and deduction. There are chapters on evaporation, the air and its movement, rain, thunder and lightning, and the effect of the weather on our lives.

MAN SENDS A MESSAGE by *Thomas Insull* 1/6

Here is the story of the development of communications from earliest times. There are simple descriptions of wireless, the telephone and other modern ways of sending messages.

OXFORD UNIVERSITY PRESS

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346 LITTLE COLLINS STREET MELBOURNE

clear type on good quality paper and bound with a spiral wire coil which enables the pages to be opened out flat. The book has been prepared by Mrs. Jamieson, of the Paton Memorial Hospital, for use in the New Hebrides; to meet requests from other areas, three slightly different versions have been printed for use in the New Hebrides, Papua and New Guinea, and the U.S. Trust Territories; copies of all these editions are available from the Literature Bureau.

MATHEMATICS

THE STORY OF MEASUREMENT. First Series; Books I - IV. Thyra Smith. London: Basil Blackwell; stg.1s.9d. each. 1956. pp. 16 each. Illust.

Nowadays we all know how to measure, but who first found out how to measure? These four little books trace the origin and development of measures of length and areas through the ages, culminating in our present-day systems. Topics covered are: Book I, How Measuring Began; Book II, The Yard, the Foot and the Inch; Book III, Measuring Land and Large Surfaces; Book IV, Measuring Roads and Long Distances. Simply written and well illustrated with attractive colour and black-and-white line drawings, these books should prove suitable for supplementary reading in Primary Schools, as well as being useful additions to school libraries.

SCIENCE

LET'S LOOK AT THE SKY. Marie Neurath. London: Max Parrish; stg.6s. 1952. pp. 36. Illust.

How big are the stars and how far away are they; why is the moon always changing its shape; what are eclipses, comets and Northern Lights? This book sets out to answer these and other such questions by means of a simple and clearly-written text and excellent coloured picture diagrams drawn on the Isotype principle. Secondary school pupils should find the book an interesting, elementary introduction to some of the "mysteries" of astronomy.

REFERENCE BOOKS

THE UNITED NATIONS. John Hornby. London: Macmillan & Co.; stg.3s.6d. 1954. pp. 57. (*Picture Pageant Series.*)

This is the first title in the *Picture Pageant* series, intended for use in secondary schools. Simply written and illustrated with many excellent photographs and line drawings, this book describes, in a narrative form, the working of the United Nations organization and its various specialized agencies. The introductory chapters give some details of the drawing up of the U.N. Charter, the formation of U.N.O. and the functions of the General Assembly and the Security Council; subsequent chapters deal with the specialised agencies—UNRRA, IRO, UNICEF, WHO, FAO, and UNESCO—and their work in improving living and cultural conditions throughout the world. This is a very attractive book, printed in a clear type on good quality paper. Other titles in the series include *Ships* and *Forests of Britain.*

ARTS AND HANDICRAFTS

LET'S DO IT OURSELVES. Clifton Ackroyd. London: Edinburgh House Press; stg.2s. 1953. pp. 43. Illust.

Teachers, parents and leaders of activity groups will find a wealth of information in this very practical little handbook intended for "keeping the active hands of boys occupied". Divided in four convenient chapters, this book explains amply and clearly the methods of making a wide range of simple visual aids which can be used in shows and exhibitions. As leaders of many boys' groups are women, with perhaps little knowledge of technicalities, the first chapter describes the simple tools and equipment needed, the method of working with pictures and paste, wood, metal and colours and doing lettering. The second section—*Ideas with Pictures*—gives careful instructions on picture collections, cut outs, friezes, bulletin boards, picture sets, posters, peep shows, transparencies and flannelgraphs; then comes *Maps and Machines* with instructions for making a silk screen printing press, a filmstrip projector, illuminated board, quiz board and an electric map. The final section—*Using It All*—shows how to use the equipment described in the preceding chapters as the basis for an exhibition or display. The illustrations are simple and clear and the instructions given are straightforward.

YOUR BOOK OF MAGIC. Alexander van Rennselaer. London: Faber & Faber Ltd.; stg.5s.6d. 1953. pp. 47. Illust.

If you have previously thought of conjuring as something difficult and perhaps mysterious then this book will soon dispel these ideas. For, as the author says—"There is really nothing magic about magic. When you are in the know it is all very simple—after a little practice. In fact, some of the simplest and easiest-to-do tricks seem the most mysterious and magical". Containing twenty-five simple but effective tricks requiring only simple apparatus, the book forms an excellent introduction to conjuring. From it can be learnt how to palm a coin, how to do tricks with ropes, how to tie a knot in a handkerchief without letting go of it with either hand, how to produce a particular card from a pack, and many other things which will mystify and delight the audience. Methods of performing the tricks are clearly described with the aid of many useful diagrams. Something new for the library.

ENGLISH COURSE

LET'S PLAY A GAME. Leon Boucher. London: Geo. Harrap & Co., stg.1s.6d. 1956. pp. 43.

The word games in this book may prove useful as an aid to the teaching and learning of English. Games can play an important part in language teaching, for not only do the children enjoy the games themselves but they quickly arouse the competitive instinct which most children possess. This little book contains 22 games which together with their variations provide at least forty-one ways of giving pupils practice in the words and skills learnt in class. Included are *spelling-games, detective-games, word-games,* and *sentence-games;* the games have been classified under three groups indicating the levels of an English Course at which they might best be used by overseas students, i.e. Group A—first two years, Group B—third to fifth years, and Group C—after the fifth year. The book was compiled originally for use in African schools, but as the words used in the examples are common to any elementary English Course it could be used with equal success by teachers in the Pacific area.

VISUAL AIDS

Films in the Commission library are marked with an asterisk before the title, and are available for viewing by any metropolitan or territorial government on application to the Executive Officer for Social Development, Box 5254, G.P.O., Sydney, N.S.W., Australia. Age classifications, where given, are intended as a guide rather than a recommendation.

Filmstrips

COCONUT CULTIVATION, PARTS 1, 2, 3, 4, 5 & 6. Produced by South Pacific Commission. Colour. No captions. Teaching notes. (Prices quoted below are sterling):

Part 1. *Selection of Mother Palms.* 21 frames 20/-
Part 2. *Selection of Seednuts.* 12 frames 16/-
Part 3. *The Coconut Nursery.* 25 frames 24/-
Part 4. *Selection of Seedlings.* 15 frames 20/-
Part 5. *Preparation of Seedling Holes.* 29 frames 24/-

Part 6. *Transplantation of Seedlings.* 29 frames 24/-

Subject: Coconut cultivation.
Medium: Drawings.
Technical Standard: Excellent.
Comment: This series has been produced in colour to accompany the book *Wealth from the Coconut,* which was published in 1955 by Messrs. Ure Smith & Co., in association with the South Pacific Literature Bureau. The strips have been designed with the purpose of assisting in improving coconut cultivation methods and standards throughout the Pacific.

Part 1, *Selection of Mother Palms,* shows very clearly the points which should be taken into account in making a selection of the most suitable mother palms. It suggests methods of marking and numbering the selected palms so that the nuts from them will not unintentionally be used for other purposes, and so that a record may be kept of the yields of nuts and copra of each selected mother palm.

Part 2, *Selection of Seednuts,* indicates the characteristics of nuts which are suitable, or unsuitable, for planting purposes, and shows how the selected nuts should be stored.

Part 3, *The Coconut Nursery,* depicts how to select a suitable site; the preparation of seed-beds; the correct spacing and planting of seednuts; and the care and maintenance which are required to assure satisfactory growth of the seedlings.

Part 4, *Selection of Seedlings,* describes the great importance of this task in assuring a healthy, uniform and high-yielding plantation. It deals with the way in which the seedlings should be cared for, and the stage at which they should be transplanted. The features of seedlings ideal for transplanting are clearly shown.

Part 5, *Preparation of Seedling Holes,* first shows a badly-planted and a well-planted coconut plantation; and then describes the correct distances at which seedlings should be planted. It continues by showing the manner in which seedling holes should be made, and how they should be prepared with manure and potash and made ready to receive the seedlings.

Part 6, *Transplantation of Seedlings,* describes how seedlings should be removed from the nursery and planted in the holes which have previously been prepared for them. It concludes by showing the way in which the transplanted seedlings should be cared for.

ATOLLS & LAGOONS. Produced by Unicorn Head Visual Aids Ltd., London. Black and white. 20 frames. Teaching notes. Published price stg.12s.6d.

Subject: Formation of coral atolls and lagoons.
Medium: Drawings and photographs.
Technical Standard: Good.
Comment: This filmstrip describes the gradual growth of a coral atoll which today forms a natural part of the geography of the Pacific Ocean. The frames illustrate the general appearance and size of coral, the geographical location of atolls in the Southern Pacific, the various stages in their development, based on the mountain peak of an ancient volcano, up to the final stages with the growth of vegetation and the coming of native settlers. The theme is logically and well developed and adequate teaching notes are provided. . . . . 11 + ages.

AUSTRALIA (PART 4). Swanland and South Australia. Produced by Educational Productions Ltd., London. Black and white. 36 frames. Teaching notes.

Subject: Geography of two areas of Australia.
Medium: Photographs, maps, diagrams.
Technical Standard: Good—average.
Comment: This filmstrip, the fourth in the series on the geography of Australia, attempts a pictorial survey of the main geographical features of south-western Western Australia and the southern portion of South Australia. The strip is divided into three parts—first, a general section gives maps and charts showing position, climatic and rainfall data and photographs of forest, parkland and scrubland of the area. The next part, comprising 12 frames, deals with resources and various occupations of Swanland—lumbering, dairy farming, apple growing, wheat cultivation and coalmining. The final section of 16 frames follows a similar pattern for South Australia, and gives a good impression of the diversity of occupations carried on, as sheep rearing, dairy farming, wine growing, mining iron ore and cotton spinning. The illustrations are generally good, and cover the more important aspects of the regions. Suitable for secondary school geography lessons.

BATTLE AGAINST EROSION. Produced by Central Office of Information, H.M.S.O., London. Black and white. 34 frames. Teaching notes.

Subject: Causes and control of soil erosion.
Medium: Photographs and diagrams.
Technical Standard: Good.
Comment: Soil erosion is rapidly becoming a major factor in the depletion of many rich crop-growing areas of the world. In this strip, clear diagrams and interesting photographs are used to illustrate natural and man-made causes of soil erosion and the counter-measures necessary to combat this wanton destruction of the land. Although the setting is Africa, the information given in this strip could also be of value to other areas having the same problem.

DINOSAURS. Produced by National Film Board of Canada (Unicorn Head Ltd., London). Black and white. 38 frames. Teaching notes. Captions. Published price stg.10s.

Subject: Prehistoric animal life.
Medium: Drawings, diagrams, maps and photographs.
Technical Standard: Average.
Comment: An interesting and instructive general interest filmstrip which reconstructs through fossilized remains the prehistoric animal life of the area we now know as Canada. Well-prepared maps clearly relate the areas in which the dinosaurs lived to the present geography of Canada. Many excellent photographs show the way in which the fossils are formed, the great care exercised in excavating them and how scientists can reconstruct the shape and form of animals using these remains. Simple mimeographed notes accompany the strip, which should be useful to supplement a secondary school geography lesson on Canada.

MAP OUTLINES. (Pilot strips). Produced by Common Ground Ltd., London. Black and white. 12 frames. No notes. Published price stg.6s.6d.

Subject: Map outlines.
Medium: Drawings.
Technical Standard: Good.
Comment: Geography, history or social studies teachers should find this filmstrip particularly useful; it is a collection of map

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Atlas For South-East Asia

R. E. PARRY

A new atlas of the world, printed in colour, with lettering in English. Among the many special features are detailed maps of Malaya, Singapore, Sarawak, Hong-Kong, and Brunei, which makes it particularly suitable for these countries. 5s.

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St. Martin's Street, London, W.C.2

outlines which can be either projected on to a blackboard or paper for copying purposes or on to a screen for teaching purposes. The maps and projections provided are: World (Mercator); the British Isles (Secant Conic); Europe, Mediterranean, Australia, New Zealand, Canada, U.S.A. (Bonne); Asia (Lamberts Azimuthal Equal Area); Africa (Sanson Flamstead); North America and South America (Lambert's Equivalent Azimuthal).

THE FIGHT AGAINST TUBERCULOSIS. Produced by Unicorn Head Ltd. in co-operation with World Health Organization, London. Black and white. 50 frames. Teaching notes. Subtitles. Published price

Subject: W.H.O. campaign against tuberculosis in Turkey.
Medium: Photographs, diagrams and maps.
Technical Standard: Very good.
Comment: All over the world millions of people die every year from tuberculosis, yet, to a large extent, this is a man-made disease which could be prevented if more people lived under healthful conditions. This strip, produced in co-operation with the World Health Organization, shows how the campaign against this disease is being conducted in Turkey with the active assistance of W.H.O. The first part explains why people who live under bad conditions are especially exposed to danger of tuberculosis and gives a brief explanation of the disease. The second part covers the work being done in the detection, prevention and treatment of tuberculosis by doctors and nurses of the T.B. Centre in Istanbul; the social services provided to assist sufferers and the training of staff to diagnose the disease. Technical quality of the strip is good, and all photographs, diagrams and maps are very clear. Well-written teaching notes in English and French are provided.

SIMPLIFIED STAGING. Unicorn Head Ltd., London, for National Film Board of Canada. Black and white. 58 frames. Teaching notes. Subtitles. Published price stg.12s.6d.

Subject: Planning and making stage equipment.
Medium: Drawings, diagrams.
Technical Standard: Very good.
Comment: Amateur dramatic groups who want to improve their stage technique will find this strip particularly valuable. In 58 frames it covers most aspects of staging and production, from simple effects through to draped stage, plastic units, and finally full scenery. Clear drawings and very comprehensive teaching notes provide a wealth of information on new ideas and suggestions for the improvement and manufacture of various stage effects and scenery. The layout of the stage, methods of hanging drapes and curtains, making backgrounds and furniture, painting scenery and arranging material on the stage are all described with adequate details of preparation and manipulation. This is a well-conceived strip, and could be seen to advantage by all interested in stage work.

OIL, PARTS 1, 2, 3. Produced by Vacuum Oil Co., Melbourne. Black and white. Teaching notes. Captions, subtitles. Price on application.

Part 1. *The Oil Hunters.* 51 frames.
Part 2. *Drilling for Oil.* 58 frames.
Part 3. *Petroleum Refining.* 61 frames.

Subject: Oil prospecting and refining.
Medium: Drawings and photographs.
Technical Standard: Good.
Comment: These three filmstrips describing modern methods of oil production were kindly donated to the South Pacific Commission Visual Aids Library by the Vacuum Oil Co. Ltd.

Part 1, *The Oil Hunters,* deals with the ways in which technicians and scientists locate oil. Early sequences describe the build-up of various rock strata, how oil is formed by the decomposition of marine life, and its subsequent occurrence in various types of land masses. The difficulties in locating oil deposits are well detailed and sequences show that even today the combined efforts of geologists and geophysicists with their magnetic, gravimetric and seismic observations can only indicate probable sources of oil and the drill must still be used for final confirmation.

Part 2, *Drilling for Oil,* describes the technique of drilling a well and portrays the tremendous effort involved in this operation. There are photographs of selection and preparation of drilling site, putting up the derrick, drilling procedure and checking the rock formation for oil signs. Clear diagrams show how the oil is trapped in various rock formations and how it is brought to the surface by making use of the gas or water under pressure which usually surrounds the oil deposit.

Part 3, *Petroleum Refining,* shows how the crude oil is treated at the refinery by various distillation and 'cracking' processes to produce petrol, diesel fuel, lubricating oils, kerosene and numerous valuable by-products. The technical quality of these strips is very good, and the comprehensive teaching notes contain ample information to supplement the captions on the strip. Suitable for use in secondary and technical science schools.

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  VOCATIONAL TRAINING IN THE SOUTH PACIFIC. By R. A. Derrick, M.B.E., A.M.I.S.E., F.R.G.S. Mr. Derrick's report consists of a survey of the facilities for professional and technical training in the whole of the South Pacific, and of recommendations for future development.
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  MOTURIKI: A PILOT PROJECT IN COMMUNITY DEVELOPMENT. By Howard Hayden. A fully documented, copiously illustrated report on a pilot project in community development carried out under Commission sponsorship on the island of Moturiki by the Government of Fiji.
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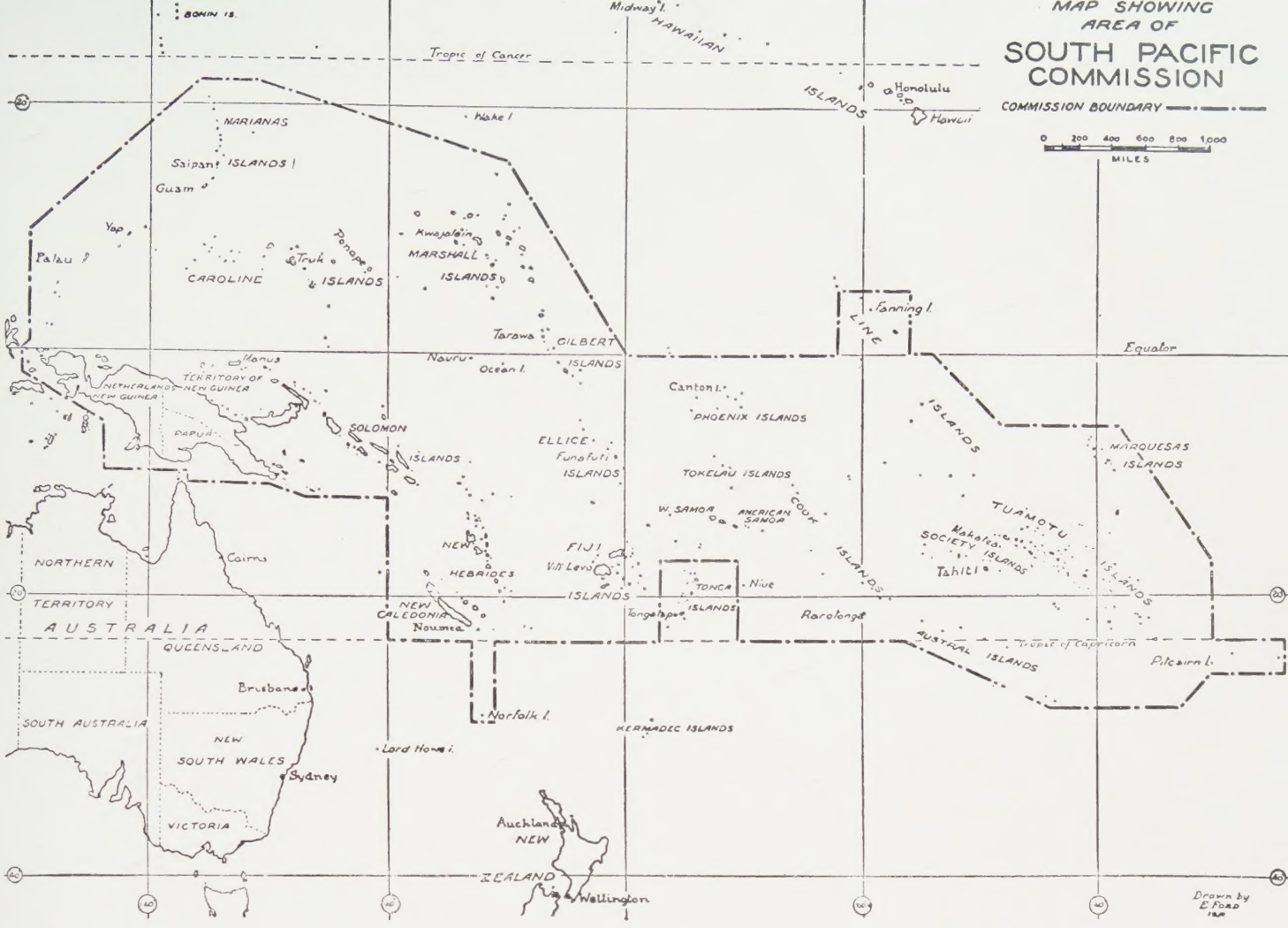

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